

Electric Railway Journal

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Consolidation of STREET RAILWAY JOURNAL and ELECTRIC RAILWAY REVIEW

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McGraw and Hill Publishing Companies Consolidate

THE McGraw Publishing Company, Inc., and the Hill Publishing Company have been consolidated as the McGraw-Hill Publishing Company, Inc. The new company acquires all the properties and interests of the two constituents, including the following technical journals: ELECTRIC RAILWAY JOURNAL, *Electrical World*, *Electrical Merchandising*, *Engineering Record*, *Metallurgical & Chemical Engineering*, *The Contractor*, *American Machinist*, *Power*, *Engineering News*, *Engineering & Mining Journal*, and *Coal Age*. Two of these papers, *Engineering News* and *Engineering Record*, will be consolidated under the name *Engineering News-Record*, with Charles Whiting Baker, now editor of *Engineering News*, as editor-in-chief.

James H. McGraw will be president of the new company, Arthur J. Baldwin (now president of the Hill Publishing Company) vice-president and treasurer, and E. J. Mehren vice-president and general manager.

IMPORTANT EVENT IN TECHNICAL JOURNALISM

The editors of the ELECTRIC RAILWAY JOURNAL take pleasure in making the announcement printed above. Each of the Hill papers, like each of the McGraw papers, has always been a leader in its field, and with the enlarged facilities for securing technical and industrial news which will be possessed by the combined organization, the ELECTRIC RAILWAY JOURNAL will be in an even better position than ever before to serve its readers. Of the group of eleven papers of which Mr. McGraw is now the head the one with which he has been longest identified is the ELECTRIC RAILWAY JOURNAL. This he acquired in 1889, when it was known as the *Street Railway Journal*. The *Electrical World* was purchased in 1899, the *Engineering Record* in 1902 and the other properties of the McGraw Publishing Company at later dates. The Hill properties were brought together gradually under somewhat similar conditions by the late John A. Hill. The present consolidation is an eminently logical one, as all the periodicals are technical journals and together they cover the five major engineering fields of civil, mechanical, electrical, mining and chemical engineering. They are animated by the same high standards, and can be of great assistance to each other in solving the problem of giving their subscribers and advertisers the best possible service.

GROWING TAXATION BURDEN

The industry is told once again, through the paper of Mr. Rand before the New York Electric Railway Association this week, that the tax question is of great and growing importance to-day. This is a truth that no electric railway will deny. In analyzing the situation, however, there are two points that electric railway officials should bear in mind, *i.e.*, that if the nation's taxes rise legitimately, utilities may justly

be expected to bear their just share, and that as much attention should be given to the problem of enforcing more wise and economical disbursements of the tax collections as to that of preventing inequitable extensions of the tax burden. These constitute the broader aspects of the case that are often lost to view. Ours is an expanding nation with growing needs, and many causes of the higher cost of government must meet with the sympathy of the public-spirited man or corporation. But if additional tax collections are made necessary only through extravagant public administration, then there is just cause for complaint. This very condition does exist to some extent without a doubt, and we feel, as Mr. Rand does, that it is encouraged by the lack of attention from business men. It is essential, of course, that electric railway officials and other business leaders should at all times endeavor to prevent the spread of pernicious taxation theories or the inequitable incidents of taxes under existing laws, but they should also feel more concerned about the disbursements. The less public money is expended wastefully the less will be the necessity of guarding against unjust and excessive taxation.

CONDITIONS INDICATED BY BRILL REPORT

The annual report of The J. G. Brill Company is a pretty good barometer of the business aspects of the electric railway industry. It has the advantage of being issued by a company the greater part of whose products are used by electric railways, whereas the business of the large electrical manufacturing companies is affected by many factors outside of the electric railway field. The Brill report was published last week in our department "Manufactures and Markets" and shows a number of interesting facts. One of these was that the sales value of the combined output of the plants of the

company during 1916 was considerably larger than during either of the past two years and indeed larger than during any other year since 1907 with the exception of the two years 1912 and 1913. Part of last year's sales, however, were for munitions. On the other hand, the net profit on sales of more than \$6,000,000 was only \$93,257, or smaller than for a number of years past. This was due to three causes. One was that a number of orders were carried over from the previous year at low prices. Another was the severity of competition, while the third reason was the high prices of material and labor, with the difficulty in getting prompt deliveries. This statement shows that this company, and the same condition probably applies to others, did not find the high prices of last year conducive to large profits and that the railways must reconcile themselves, for some time at least, to paying more for their cars and other equipment. While the competition mentioned in the Brill report will probably keep the profits in such sales to a reasonable amount, there is no reason to expect that the added cost of manufacture will be borne by anyone except the consumer.

DRAINING THE TRACK

Years before electric motive power was applied to car haulage the importance of a thoroughly drained roadbed was well understood by way engineers. Judging from some recent observations, however, not all electric railway operators have profited by the ripe experience of the past. In small cities and towns it is not infrequently the case that interurban roads enter over unpaved streets and that the outlying lines of local street railway systems also traverse unimproved streets. The surface drainage on such streets, as a rule, is very inadequate. Pools of water stand on or close to the tracks, and the pumping action given the ties by passing cars soon reduces the ballast to the consistency of gruel. As gruel was never intended for a track support, rail alignment is soon destroyed, joints and bonds are broken, the cars ride roughly and occasionally derail, schedules cannot be maintained, and the people complain about the service and their run-down-at-the-heel electric railway system. In one case observed the track had been recently realigned and reballasted with a good grade of gravel ballast, but as the result of several heavy rains following each other in close succession the final state of the track was worse than the initial state. In a comparatively few hours the heavy rains and traffic had offset the labors of a large gang of track men for a week.

With the breaking up of winter and the coming of the spring rains the drainage problem is just now one of considerable moment to many roads, particularly those located in the northern part of the country. Electric railways certainly are not responsible to the public for street drainage or the lack of it, but nevertheless, because those who are responsible have either ignored or shifted the burden, the problem is one that must be faced. In many cases the judicious use of a few field tile would go a long way towards solving the problem as far as the railways are concerned, and as such drain-

age work is cheap in comparison with track maintenance, it would seem to be on the side of true economy to spend for drainage some of the money now spent for track maintenance.

AN IMPORTANT INTERURBAN PROJECT WELL UNDER WAY

In view of the present state of suspended animation in the field of electric railway construction it is refreshing to follow the progress of the \$3,500,000 development which will soon furnish high-speed and frequent service between Buffalo and Niagara Falls, N. Y. An electric line belonging to the International Railway already connects these cities and gives through service, but so much of the road is in city streets, involving many stops and sharp turns, that serious competition with the steam railroads has been out of the question. The new line, which is also to be built by the International Railway, is largely on private right-of-way, and the equipment has been selected with a view to making the most of this fact. Unfortunately the line will be obliged to use the city streets at both ends, but in the Tonawandas, located about midway between terminals, a cut-off has been provided, and numerous bridges will eliminate practically all grade crossings.

It is fitting that high-speed electric traction should be adequately represented at one of the show spots of our country. With electrical energy so plentiful and so cheap in this vicinity, it is the appropriate motive power for this interurban service. The International Railway has been doing everything possible with the means at hand to attract visitors to the Falls, but it has lacked an almost essential element in not having quick means for getting visitors over from Buffalo.

From the technical point of view the problems which had to be solved in this project are unusually interesting. For an interurban line it is not usually necessary to combine high accelerating power with high running speed. Obviously the two are not inherently compatible, for high speed means in general a weak motor field, whereas quick acceleration requires a strong one. The tap-field motor, however, provides both of these features, and in the present case the tap-field principle has been utilized to the full, as it can be with the aid of commutating poles. It will, therefore, be possible to accelerate at 1.5 m.p.h.p.s. and yet make a free running speed of nearly 60 m.p.h. The tapping of the fields will be done in this case by means of a tapping unit separate from the power contactors, with separate current-limit relays to provide for independent current settings with full and reduced field. The result will be increased flexibility of control.

An article on this property is of interest just now not only because of its novel electrical features, but because two larger steam lines desire to acquire the stock of the Frontier Electric Railway, on whose right-of-way in part the new road is located, for the purpose of building an electric freight line. The project is under investigation by the Public Service Commission for the Second District, to determine whether or not an additional freight line is needed. If the desired permission is

granted the Frontier Electric Railway will become one of the most important short electric lines in the country. The high-speed passenger line is not affected by this project, however, and is being pushed to completion rapidly.

TO-DAY'S STATUS OF THE SMALL WHEEL

An account of the new type of car for St. Paul and Minneapolis, which was published in last week's issue, had a special element of interest in that it displayed the conservative Twin City Rapid Transit Company as adopting the small wheel for new equipment. This makes it timely to review the status of this very important development in city car design.

With the latest additions to the list there are at present eight out of fifty-six cities of more than 100,000 population which make use of wheels 26 in. or less in diameter on regular equipment. Of these, Pittsburgh, Cleveland and San Francisco are the most important. The first-named has used 24-in. wheels since 1912 and the two last-named have used 26-in. and 24-in. wheels respectively for about three years past. In no case has any appreciable difficulty been experienced, and in this connection special emphasis should be laid upon the absence of trouble from small clearances at the center and ends of the car body during the passage of vertical curves, for which both Pittsburgh and San Francisco are notorious. The same satisfactory features seem to apply universally in the case of the other large cities where small wheels have been introduced, as well as to the very considerable number of towns whose lesser population does not warrant their being singled out, and in no case with which we are acquainted has any company, after trying out the new type of equipment, returned to the old-style large-diameter wheel.

The record of the small wheel may, therefore, be said to be perfect, and it is pertinent to consider the reasons why its popularity has not grown more rapidly—since introduction on 12 per cent of the country's large city systems in the course of five years is by no means extraordinary for such an obviously valuable feature. The condition seems to have been largely due to an early distrust of the small-dimension motors necessary to provide clearance over the paving. When the low-floor motor was first developed it looked like a violation of all laws of nature and trigonometry, and a great deal of criticism was in evidence on the grounds that it must have been "skimped" in manufacture. There was also a tendency to lay stress upon the economy in maintenance of two-motor equipments, and since the first of the low-floor motors was a little too small to handle the weights of the then-existing cars on maximum traction trucks, it was argued that extra maintenance would be involved if four small motors were installed per car when two slightly larger ones would do the work.

Neither of these objections was borne out in fact, although they may have been conceived on sound theory, because the apparent skimping of the small motors was really due to the use of commutating poles and ventilation for the first time on 30-hp. equipments, and the extra cost of maintaining a four-motor equipment, say,

\$20 or \$30 per annum with modern motors, becomes insignificant when compared to the savings in power effected by the light motors and small wheels. Nevertheless these objections and other less logical ones, such as the cost of carrying two sizes of wheels in stock, kept the small wheel from receiving general consideration for fully three years after it was first brought into use, and so far as its actual commercial development goes, one may say properly that it is not yet two years old. Under these circumstances its growth has, in reality, been at a rapid rate, and within another half-decade it will undoubtedly be found on the major number of all new cars that are built for city service.

RAPID-TRANSIT PLAN FOR SYDNEY

The proposed rapid transit plan for Sydney, the leading seaport of Australia, which is described in outline on another page of this issue, has met a traffic situation which offers in many respects a small-scale parallel to that of New York City. The business district of Sydney is located on a 2-mile-long peninsula; and because of its topographical limits it is extraordinarily congested. Rush-hour traffic to the residence districts has already reached the limit of the existing surface railway facilities, and even the steam railroad system that handles suburban traffic is nearing the end of its rope. Consequently the necessity for a loop subway under the business district with high-speed lines on the surface branching off to outlying suburbs is almost obvious.

Two features of the plan, however, are distinctly novel—if one excludes the use of bridges instead of subways across the estuaries bounding the city. The first of these is the electrification of the suburban steam railroads now reaching the city and their operation in conjunction with the subway underneath the business district. Suburban trains, therefore, will not be turned at the steam railroad terminal station but will be routed into the subway, around the loop and out into the country again. The primary requisite of this plan is, obviously, that the subway tube must be large enough to take full-sized rolling stock, and this of course means a large construction expense. On the other hand there comes an indirect saving through more rapid movement of cars that may go far to offset the added first cost, and there is also much greater convenience for passengers, who are thus relieved of the customary change of cars from rapid transit service to suburban lines.

The second feature of note is the proposed use of reservoir stations having bifurcated tracks so that alternate trains make their stops on opposite sides of an island platform. The result can be secured obviously either by a track switch which shunts the individual trains first on one side and then on the other or by the use of gauntleted tracks. This plan, which largely doubles the capacity of each track, is not new in theory. It was suggested in 1908 when the construction of the new subways in New York was under consideration but was not adopted, presumably because of complications feared from a transportation standpoint. In consequence, the results attained with it in Sydney should be particularly interesting, when they are available.

Buffalo-Niagara Falls High-Speed Line

Quick Acceleration, High Running Speed and Frequent Service Are to Be Characteristics of New Line on Private Right-of-Way Now Under Construction Between These Two Cities

THE officials of the International Railway, Buffalo, N. Y., hope before the end of the present year to be able to open the high-speed line between Buffalo and Niagara Falls. As shown by the table below, the proposed schedule calls for exactly one hour between termini in the heart of the two cities, a distance of 23 miles. This time allows for eighteen stops and fifty slow-downs, and requires a free running speed of nearly 60 m.p.h.

	Distances and Schedules		Slow-downs	Time, All, Minutes
	Miles	Stops		
Court Street to Main and Erie (Buffalo)	4.9	9	43	25
Main and Erie to Portage Road and Buffalo Avenue (Niagara Falls)	16.64	6	0	27
Buffalo Avenue and Portage Road (Niagara Falls) to Terminal Station (Niagara Falls)	1.43	3	7	8
Totals	22.97	18	50	60

This project involves the construction of a double-track line on the right-of-way of the Frontier Electric Railway, which the International Railway purchased somewhat more than a year ago. It consists of a 66-ft. strip located as indicated in the accompanying map. This parallels one of the existing steam roads for a part of the route, with a detour at North Tonawanda. The double-track line will run from Main and Erie Railroad in Buffalo to Portage Road, Niagara Falls, and will connect with the present tracks in these two cities. All street crossings in Tonawanda will be

Data on Car for International Railway High-Speed Line

Seating capacity.....63

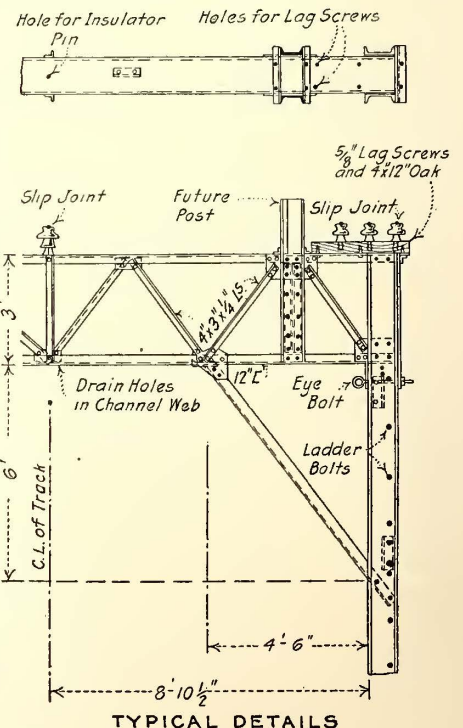
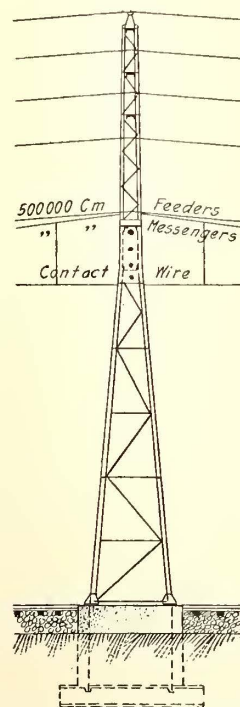
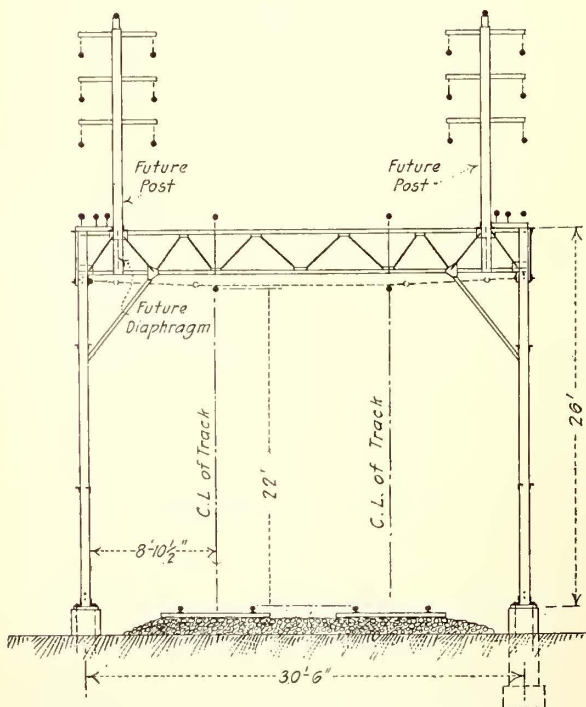
WEIGHTS

Body.....27,000 lb.
 Trucks.....19,000 lb.
 Air brakes and auxiliaries.....1100 lb.
 Motors and control.....10,670 lb.
 Total.....57,770 lb.

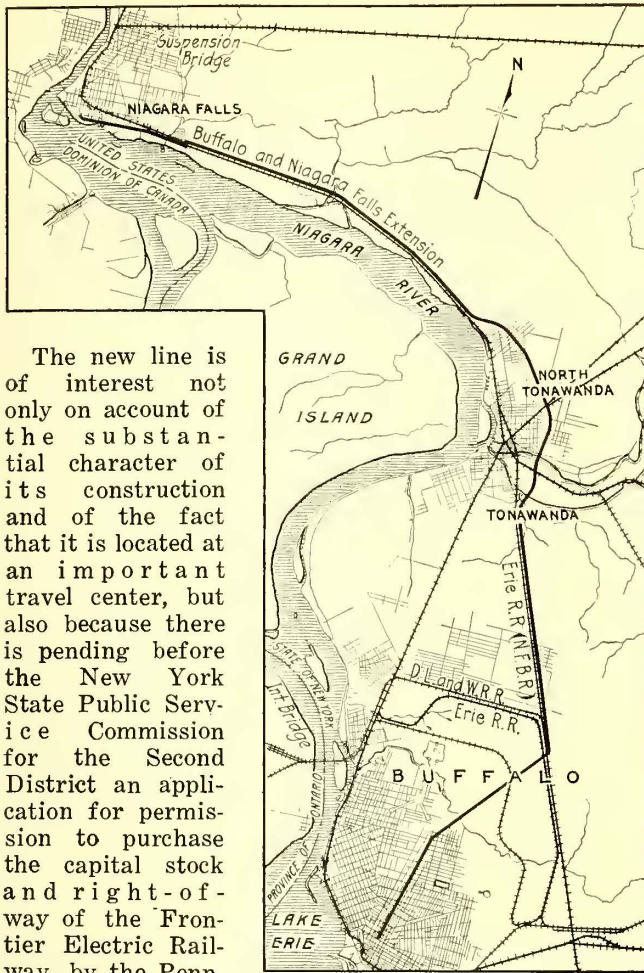
GENERAL DIMENSIONS

Over-all length.....54 ft. 7¼ in.
 Truck centers.....32 ft.
 Width over side posts.....8 ft. 6 in.
 Height rails to underside of sill.....2 ft. 10¾ in.
 High rails to copper floor.....3 ft. 4¾ in.
 Height rails over trolley board.....12 ft. 3 in.
 Height rails to first step.....13¾ in.
 Width of center door opening.....3 ft. 11 in.
 Height car floor to ramp of car.....10 in.
 Ramp from bolster to wall.....6 in.
 Width of aisle between seats.....27 in.
 Width of rubber tiling in aisle.....24 in.
 Length of seats.....31 in.
 Height of seat backs.....19½ in.
 Center to center of seats.....31½ in.

eliminated and nearly all in North Tonawanda. The maximum grade will be 0.7 per cent, and this grade will be about 3000 ft. long. The construction is now considerably more than one-half completed.



BUFFALO-NIAGARA FALLS HIGH-SPEED LINE—DIAGRAM OF OVERHEAD BRIDGE STRUCTURE, WITH DETAILS OF CORNER BRACING AND POSSIBLE FUTURE TRANSMISSION LINE POST



MAP OF REGION, SHOWING NEW LINE AND STEAM RAILROADS

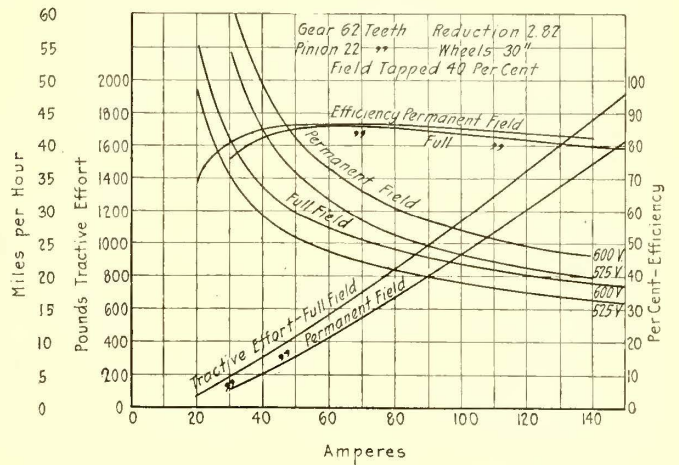
The new line is of interest not only on account of the substantial character of its construction and of the fact that it is located at an important travel center, but also because there is pending before the New York State Public Service Commission for the Second District an application for permission to purchase the capital stock and right-of-way of the Frontier Electric Railway, by the Pennsylvania Railroad and the Delaware & Western Railroad. These roads propose to build a line contiguous to the high-speed line of the International Railway, this line also to be electrically operated.

WAY AND STRUCTURES ON NEW LINE

Between the two terminal cities the line will cross only two improved streets at grade, these being in North Tonawanda. The elevation of the roadbed through the Tonawandas involves a fill from 16 ft. to 24 ft. high, 2½ miles long. In making this fill, which was practically completed last season, it was necessary to move 600,000 cu. yd. of earth from a cut and embankment at the north end.

At street crossings plate-girder bridges with concrete abutments will be used, the designs being such that very

heavy traffic can be carried. Along the line there are also to be four truss bridges, a Scherzer lift bridge over Tonawanda Creek, and several plate-girder bridges in addition to those used for street crossings. Besides Tonawanda Creek the road crosses the New York Central tracks, Mill Creek, Ellicott Street, State Ditch,



BUFFALO-NIAGARA FALLS HIGH-SPEED LINE—CHARACTERISTIC CURVES OF MOTORS

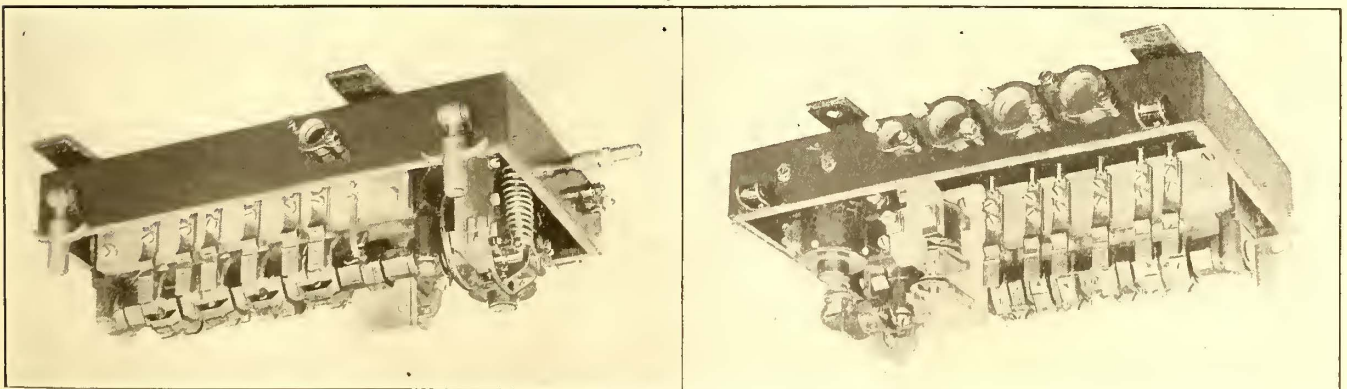
Cayuga Creek, Gill Creek and the Gratwick Trestle. The work on the bridges, the masonry work and the grading are being done by contract. The American Bridge Company is building the track bridges as well as the catenary bridges for the overhead structure, mentioned below.

In the track construction broken stone ballast is to be used, with standard A. S. C. E. 85-lb. rail laid on untreated white oak sawed ties. The joints will be of the Abbot type, made by the Lackawanna Steel Company, and the joints are to be bonded with the Ohio Brass Company's compressed-terminal bonds.

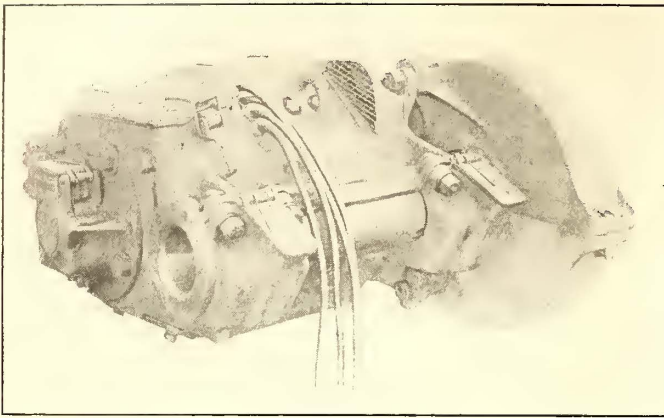
CATENARY OVERHEAD TO BE USED

The overhead construction will be of the standard catenary type with steel towers and bridges spaced 200 ft. apart. The No. 0000 grooved hard-drawn copper contact wire will be suspended 22 ft. above the rail with a hanger spacing of 10 ft. For the hangers a special clip has been designed, the details of which are shown in an accompanying half-tone. At the towers 5/16-in. steel span wires are to be installed to hold the contact wire against swaying, two insulators in series being placed on each side to insulate it from ground.

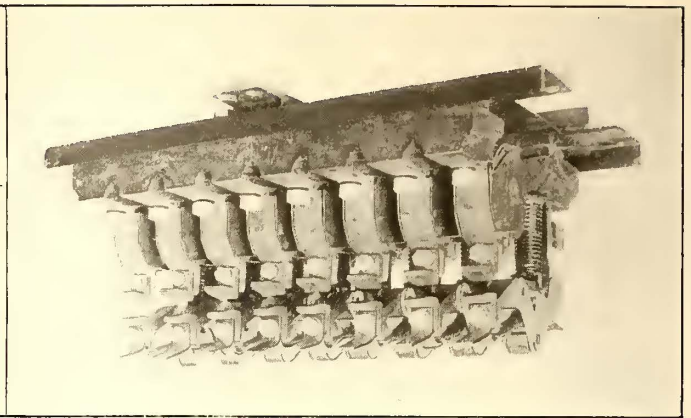
In the overhead construction 1,025,000 lb. of copper will be employed. This includes the weight of a 500,000-circ. mil messenger cable, and two 500,000-circ. mil feed wires as well as the contact wire.



BUFFALO-NIAGARA FALLS HIGH-SPEED LINE—TWO VIEWS OF FIELD-TAPPING UNIT WITH COVER REMOVED, IN INVERTED POSITION AS MOUNTED UNDER CAR



BUFFALO-NIAGARA FALLS HIGH-SPEED LINE—VIEW OF MOTOR SHOWING SCREENED VENTILATING OPENING



BUFFALO-NIAGARA FALLS HIGH-SPEED LINE—CONTACTOR UNITS OF CONTROLLER

On the bridges insulators standard with this company are to be used. Details of these are shown in the accompanying drawing. For dead-ending on bridge trusses lignum vitæ spools will furnish the necessary insulation, while the regular bridge insulators contain porcelain spools.

POWER SUPPLY

The contact line voltage is to be 600 and the high-tension transmission voltage 11,000, although provision is made at the substations for doubling this if necessary. The power supply is from the Niagara Falls Power Company and the railway company's power plant in Buffalo. The latter is now being enlarged by the addition of a 5000-kw. steam turbine.

A new substation will be built in Niagara Falls and will contain two 1000-kw. and four 400-kw. General Electric rotary converters. These will have a capacity rating of 50 per cent overload for two hours and 200 per cent momentary overload. They will be provided with the necessary auxiliaries, including three-phase oil-cooled transformers, with primaries wound for 22,000 and 11,000 volts, and secondaries wound for 430 volts. At the Tonawanda substation, located midway between Buffalo and Niagara Falls, three present 400-kw. rotaries will be replaced with three 1000-kw. rotaries similar to the above. The Fillmore Avenue substation at Buffalo has also been re-equipped so that there are now three 1000-kw., one 400-kw. and one 2000-kw. rotaries in place.

Connecting the new line with the substations there will be two 1,000,000-circ. mil feeders from Buffalo, four of the same size from Tonawanda and two of the

same size from Niagara Falls. From the substations to the line the feeders will be carried underground.

In its application to the commission for permission to build this line, the International Railway estimated the following as the costs of construction: Right-of-way and real estate, \$850,000; bridges and culverts, \$514,060; buildings, including one substation, three stations, two waiting rooms and one shelter house, \$122,900; track, line, grading, and contingencies, \$1,800,000, and substation equipment, \$110,500. An allowance of \$160,000 was also made for the sixteen cars described later, making a total estimated expenditure of somewhat more than \$3,500,000.

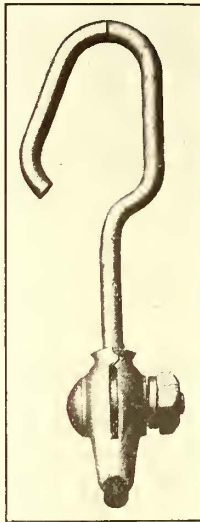
ROLLING STOCK

A tabular statement of the details of equipment of the cars for the high-speed line was given in the issue of the ELECTRIC RAILWAY JOURNAL for Jan. 6, 1917, page 61. Some of the more important dimensions and weights are given in the table on page 378.

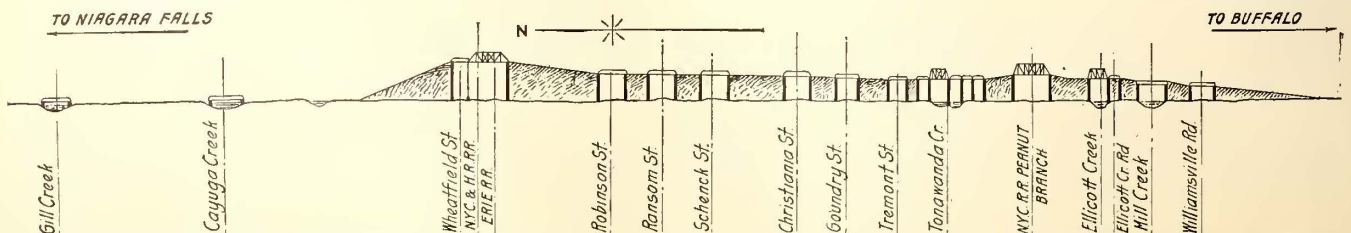
The cars are to be of semi-steel construction, equipped for double-end operation. The center-entrance type was selected in order to secure quick loading and unloading. The bodies will be divided into three sections, one for baggage, one for smokers and one for non-smokers. They will be arranged for the possible later installation of toilet rooms which may be located either near the center entrance or in a corner of the baggage compartment.

The bodies will have steel underframes, side, corner and vestibule posts, carlines and top plates. The inside trim and partitions will be of mahogany and the head-lining of Nevasplit. Under the seats, all of which excepting those near the entrance-exit are to be of the cross type, the floor will be double with 13/16-in. yellow pine top and 13/16-in. maple bottom. In the aisle the top will be of 5/16-in. interlocked rubber tiling, 24 in. wide, which will run the full length through the center of the car from the baggage compartment to the motor-man's compartment at the opposite end.

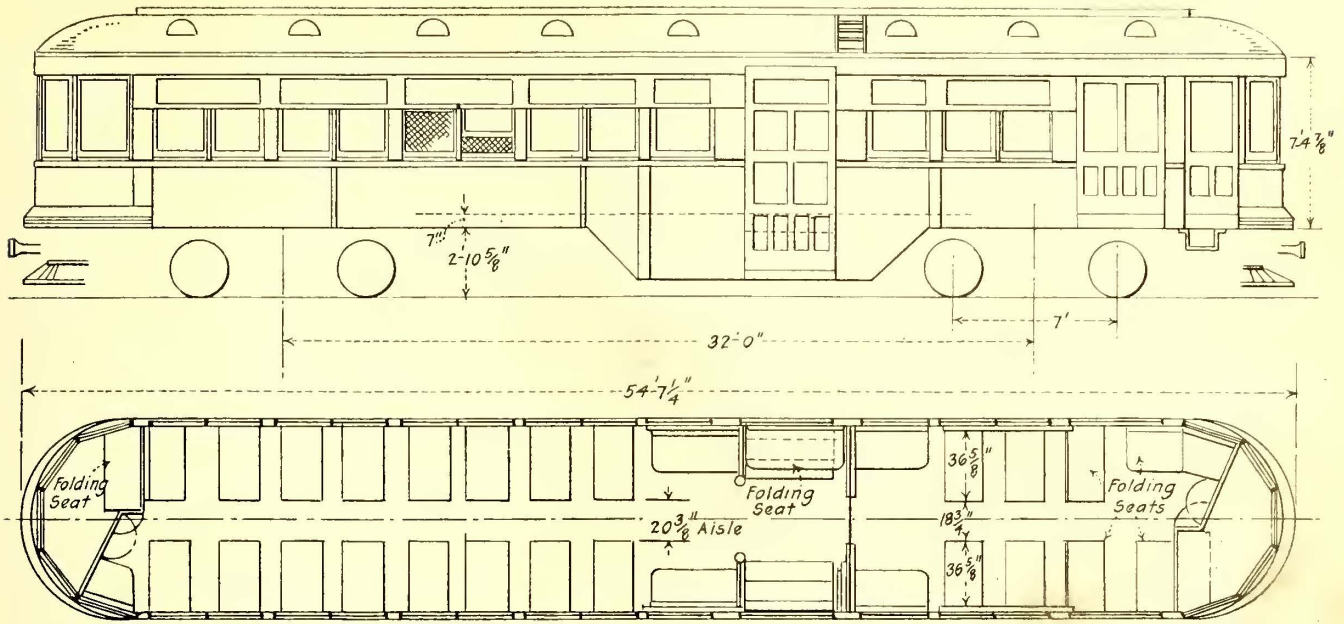
Without going into superfluous detail, the following items may prove of interest in visualizing this car: The roof of the car will be of the arch type with detachable



CATENARY HANGER AND CONTACT WIRE CLIP



BUFFALO-NIAGARA FALLS HIGH-SPEED LINE—LONGITUDINAL SECTION OF FILL AND APPROACH, WITH BRIDGES, NOT TO SCALE



BUFFALO-NIAGARA FALLS HIGH-SPEED LINE—PLAN AND ELEVATION OF CAR

hoods. The underframe will be continuous under the platforms, and Hedley anti-climbers will form the bumpers. Three entrance steps are to be provided with ends inclosed, and there will be two-rung ladders immediately below the motorman's exit doors. On the roof will be copper gutters over the door openings, and two trolley boards will run the full length of the body supported on oak brackets over each steel carline.

MOTORS AND CONTROL

The motor equipments for the new cars will consist each of four GE-203-P, ventilated, commutating-pole motors, having a normal one-hour rating of 50 hp. at 600 volts. The gear ratio used is to be 62:22, equivalent to 2.82. The control will be of the standard PC-5 type, cam-operated, by means of which the individual contactors are actuated by a camshaft and, therefore, open and close in a definite sequence. A current-limit

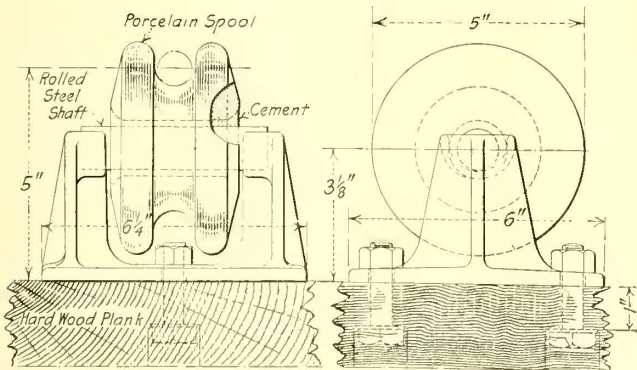
relay mounted in a metal containing box. This unit is shown in two accompanying reproductions from photographs. The cylinder is held in the "off" or full-field position by a substantial coil spring. The admission of air to the operating cylinder is effected by a small magnet valve energized from the control circuit. Upon the admission of air, the spring is compressed and the cylinder moved to the "on" or tapped-field position. Upon the failure of either the control current or the air pressure the connections are returned to the full-field position.

In order that the motors may be tapped at an opportune time the control circuit which actuates the air valve is completed on the full parallel position of the motor controller, after the motor current in the field-tapping relay coil has dropped to a predetermined value. As the field-tapping switch includes a separate current-limit relay, this allows the motors to be operated at a different current setting from that used in the full-field position. Either the current-limit relay in the motor controller or the relay in the field taper may be adjusted to any current values within reasonable range, and will thus automatically control the acceleration of the equipment. The normal adjustment is designed for an acceleration of 1.5 m.p.h.p.s.

The gear ratio of 2.82 with these motors provides for a free running speed of nearly 60 m.p.h., at the same time allowing the use of the high rate of acceleration by the use of 40 per cent of field tapping. High running speed and quick acceleration were necessary to provide the required high-speed service, in view of the number of stops and slow-downs called for by the schedule.

OTHER DETAILS OF THE CAR

For illumination there will be a circuit of six 94-watt lamps, one in the baggage compartment, two in the smoker, and three in the main compartment. Five will be in series with a selector switch to insure that this number will be burning at any one time. There will also be an 8-lamp circuit of 36-watt lamps arranged so that five will be burning at any one time. The electric heaters will be of the truss-plank type. An electro-pneumatic air signal will be installed in the motorman's cab. The air-brake equipment is to be of the automatic type with cooling coils arranged in manifold, and includes automatic slack adjusters.



BUFFALO-NIAGARA FALLS HIGH-SPEED LINE—INSULATOR FOR USE ON BRIDGES

relay, which is located in the control box, can be so adjusted that the control circuits are completed at proper intervals to maintain the necessary motor current to secure uniform acceleration of the car.

Maximum speeds are to be obtained by tapping the motor fields in the full multiple connection. The apparatus to be used for tapping the fields is entirely distinct from the main control and consists of a field-tapping unit, including an air-operated cylinder and a current-

Rapid-Transit Plan for Sydney

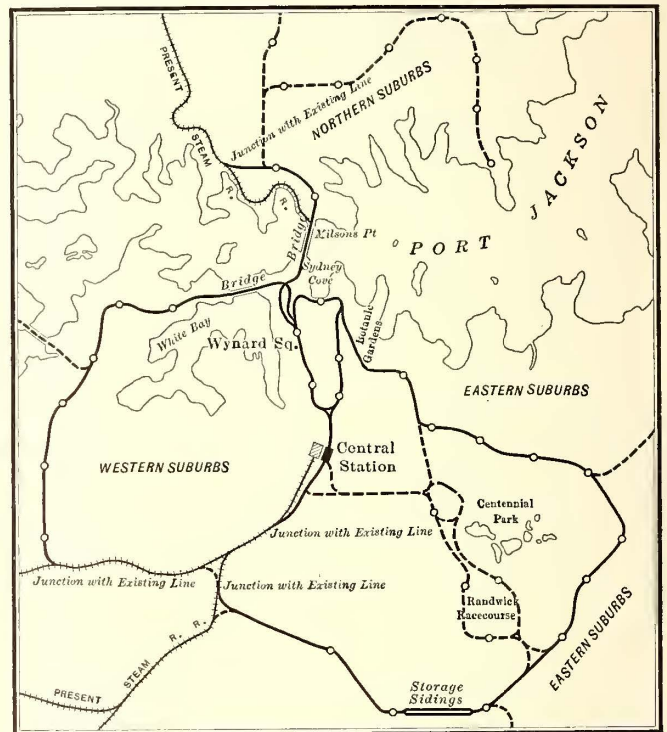
A Report on the Projected High-Speed Railway System for This Australian City, Including Electrification of Suburban Steam Railroad Service, Has Been Prepared by the Department of Public Works of New South Wales and an Abstract Is Published

A REPORT on the projected rapid-transit system for the city of Sydney, New South Wales, Australia, has been prepared by the Department of Public Works, and its salient points have been abstracted and rearranged in the following paragraphs. The work recommended in this report includes the following items, which are to be undertaken in the order shown: The electrification of the inner-zone suburban service for a distance of approximately 15 miles on the steam railroads radiating from the city; the construction of an underground rapid-transit loop serving the city's business district together with electric railways in tunnel, on viaduct and on the surface in private right-of-way that will give high-speed service to the eastern, western and northern suburbs; the construction of two long-span cantilever bridges across arms of the harbor lying to the north and west of the business district of the city; the electrification of the outer zone suburban railways for a radius approximating 40 miles from the city, and the construction of an underground loop line for tram cars to reduce the congestion at the street surface within the business district. The ultimate cost of all this work will amount approximately to \$100,000,000 exclusive of real-estate payments.

At the present time the work in hand, which is to be completed in 1919, includes the construction of the underground rapid transit loop, which is called the City Railway, and about half of each of the railways to the eastern and western suburbs, as well as the provision of additional power to the extent of 45,000 kw. in the present power station at White Bay, the estimated cost of this part of the work being \$32,000,000. The authorizing act provides also for the electrification of certain of the inner-zone suburban traffic on the steam railroads, together with the installation of the necessary power and rolling stock, thus involving a further expenditure of some \$18,000,000, making up in all about half of the estimated cost of the whole project. The method of procedure provides for the immediate electrification of 15 miles of one of the steam railroad lines so that this can be worked electrically to familiarize the department officials with electric operation for a year or more prior to the introduction of complete electrification.

EXISTING TRAFFIC CONDITIONS IN SYDNEY

The passenger traffic of the metropolitan area of the city of Sydney, which ranks as the fourteenth seaport of the world, based on inward-bound shipping, is at present carried on in part by steam railroads terminating at Central Station on the south side and at Milson's Point across the bay to the north of the city, whose business district is in the form of a peninsular that runs due north and south for about 2 miles and is bounded by a harbor to the west and by a large park to the east. Steam ferries convey passengers not only to the suburbs on the northern side of the bay but also to other points along the estuary extending for many miles east of the city. The traffic of suburbs that are not served at present by these steam railroads or ferries is carried by electric tramways. The tramways are



SYDNEY RAPID TRANSIT—PLAN OF CITY AND IMMEDIATELY-ADJACENT SUBURBS SERVED BY NEW SYSTEM

required also to convey the railway and ferry traffic through the congested business district of the city.

During the past four years traffic on the tramways has increased at the rate of about 12 per cent per annum and has now reached the saturation point. It is almost impossible to accommodate more cars on some routes during the evening rush hour. The combined steam-railroad, ferry and tramway traffic in the metropolitan area during the year 1914 amounted to 394,000,000 passengers, a daily average of 1,163,000. Of these the suburban steam railroads handled 73,000,000; the ferry steamers 35,000,000, and the tramways 286,000,000.

On the steam railroads terminating in the city of Sydney the suburban operations greatly exceed those train movements classified as through service. Special loop lines for freight are now under construction, and soon all freight traffic will be practically dissociated from the inner-zone suburban passenger traffic. Even so, the traffic at Central Station is extremely congested, since about 312 trains depart and the same number arrive daily, in addition to about sixty empty passenger trains in each direction. The peak load at the station occurs between 5 p. m. and 6 p. m., the average for the hour being about ninety-six trains. At Milson's Point the traffic is relatively light, approximately fifty trains arriving and fifty departing each day.

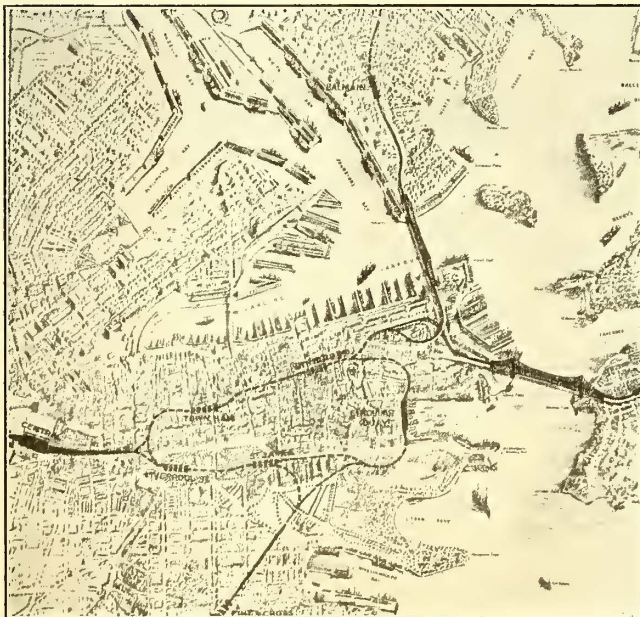
DETAILS OF PROPOSED RAPID-TRANSIT PLAN

As shown in the accompanying diagram, the new rapid transit plan includes a two-track subway loop ex-

tending completely around the business district of the city. From this a two-track loop line branches off to serve the western suburbs and another to the eastern suburbs, while a two-track line runs to the north and joins the steam railroad now terminating at Milson's Point. The two lines that branch off to the north and west cross the harbor on bridges 170 ft. above high-water level, and all three of the exterior lines, after branching off from the subway loop, are run generally in the open air, making use of viaducts, embankments, open and covered cuts and tunnels according to topographical features of the private right-of-way. Extensions will be required at a later date, as shown by the dotted lines on the map, and in addition a double-track underground tramway will have to be installed in the business district to remove some of the traffic from the surface. This underground tramway will form a loop inside of the City Railway, but at the south end it will branch off to east and west for about 1 mile before coming above ground and connecting with the existing surface tramway system.

The unusual procedure of adopting underground tramways has been recommended, not so much as a means for satisfactorily relieving the dense passenger traffic, but rather as a means for facilitating the vehicular and pedestrian traffic by the removal of the tram cars from the streets in the business district. The cost of the underground tramway can be justified for this latter purpose, but not for the former, since the volume of traffic that could be taken by the two-car tramway units is small compared with what could be taken by electric railway trains.

Thus in the city proper the railways and tramways will be wholly underground, while the railways of the northern, eastern and western suburbs will be on private right-of-way and will not obstruct the streets or be any detriment to the adjoining property. The railway stations have been so located that the outlying tramways will act as feeders, and it is planned that



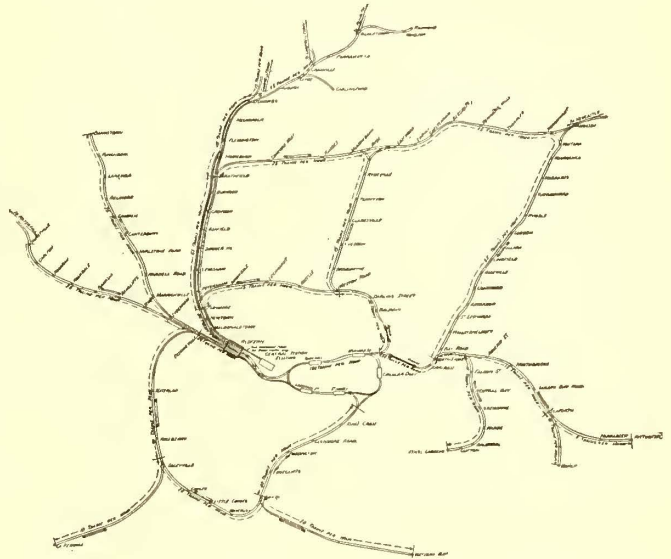
SYDNEY RAPID TRANSIT—BIRD'S-EYE VIEW, SHOWING PROPOSED SUBWAY LOOP IN BUSINESS DISTRICT

passengers can obtain daily or season tickets to cover both railway and tramway journeys.

By the unification of operations for both tramways and rapid-transit trains it is planned not only to reduce the total cost of each passenger journey by an appreciable amount, but in addition to cut the time of the

journey very materially in many cases by more than 50 per cent.

The present steam-railroad suburban service to and from the city is, as before mentioned, to be electrified as part of the general plan. By this means the train capacity of Central Station should be increased by 60



SYDNEY RAPID TRANSIT—GENERAL PLAN OF COMPLETED SYSTEM

per cent, and by providing suitable rolling stock the passenger capacity of trains could be increased 100 per cent, making a total increase in capacity for Central Station of 220 per cent and enabling 78,000 passengers to be dealt with during the rush hour instead of 24,500 as at present. When it is electrified this suburban service will not terminate at Central Station, but will be routed over the City Railway through the subway around the business district of the city. In consequence, a four-track line branches off from the existing railroad system at a point about 1/2 mile south of the terminal at Central Station and runs northward approximately parallel to the railroad tracks to the eastern side of the present building, where an eight-platform open-air station will be provided. The through traffic will be handled from stub end tracks, as at present, but the four-track electrified line will continue northward through the station and will join the subway loop of the City Railway at its southerly end.

OPERATING PLAN FOR NEW SYSTEM

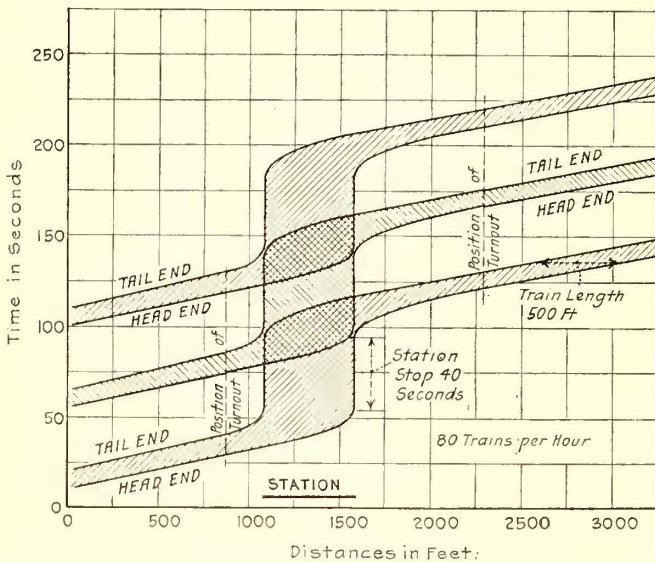
The City Railway loop will have five stations, of which one, Wynyard Square, is especially important and will have two levels. On the lower level the City Railway trains will be accommodated, while the suburban trains from the northern suburbs that pass across the high-level bridge at Milson's Point will be served by the upper platforms. Some of the latter trains will connect also with the City Railway loop at a point south of Wynyard Square so that they may serve the Central Station and stations on the subway loop.

North of Wynyard Square station the subway is changed to overhead construction for a short distance to serve the ferry terminal in Sydney Cove at the northern end of the city and to provide approaches for the line that will cross the bridge to serve the northern suburbs. In addition there is a branch from the subway leading up to the approaches of the other high-level bridge, which serves the western suburbs. On the eastern side of the City Railway loop another line branches off to the eastern suburbs, coming above ground about 1/2 mile away. The main loop is approxi-

mately 1 mile from end to end and about $\frac{1}{2}$ mile across. About 16 miles of track, of which half is above ground, are included.

On the City Railway the stations provide for island platforms 520 ft. long. Bifurcation of track at the platforms has been adopted to eliminate the effect of the station stop on track capacity, while congestion is avoided by separating the incoming and outgoing traffic as it moves from the platform to the street and vice versa. A maximum speed of 35 m.p.h. will obtain on straight level track and down grades, and the schedule speed, including station stops, will be half the maximum speed, or 18 m.p.h.

With regard to the use of bifurcated tracks, the report states that the capacity of a rapid-transit railway is measured by the number of trains that can traverse a single track during the evening rush-hour. The number of trains depends primarily upon the length of station stops, and if the effect of the stop can be eliminated the capacity is increased. This can be done by bifurcating the tracks at each station and providing for alternate trains to stop at opposite sides of



SYDNEY RAPID TRANSIT—DISTANCE-TIME CURVES, SHOWING EFFECT OF BIFURCATED TRACKS AT STATIONS

an island platform. The capacity of the line is then governed practically by the minimum possible headway between trains on a single track. At Wynyard Square Station, where it is estimated the station stop will be forty seconds in duration, there will be handled by far the greatest part of the traffic on the City Railway, and the length of stop at this point will determine the train capacity of the whole railway, the stops at the other stations being estimated at only fifteen or twenty-five seconds.

The accompanying distance-time curves display the effect of the bifurcated track. In these the length of station stop has been taken at forty seconds. The average acceleration has been taken at $1\frac{1}{4}$ m.p.h.p.s., the maximum speed 35 m.p.h., and the average rate of braking $1\frac{3}{4}$ m.p.h.p.s. Operating under these conditions the capacity of a single track not bifurcated at platforms is, with automatic speed control, forty trains per hour and, with visual signaling, thirty-four trains per hour. With tracks bifurcated at platforms some eighty trains per hour with automatic speed control, or sixty-eight trains with visual signaling, can be operated on a single track. These figures are determined by the shortest necessary running distance between trains. This minimum distance is about 800 ft., and it must be maintained for an appreciable interval of time

after one train has completed acceleration and just before the other train commences braking. The schedule, as called for in this case, requires that both trains shall maintain almost full speed during this time interval, which would be impossible without automatic speed-control brought about by combinations of contact ramps. Cab signals and automatic speed-controlled train stops would also have to be provided.

Paradoxical as it may seem, a train under this plan is approached less closely by the next train behind it than by the third train in the line. This is because the second train has passed to another track when the first train is accelerating after a stop. The minimum space between a first and a second train is 1175 ft., while that between the first and third trains is 800 ft. Bifurcation of tracks on a double track loop gives one-third greater capacity than a plain three-track loop.

Thus, the two-track loop subway, with automatic speed control, will have a maximum theoretical capacity of 160 trains per hour into the city and 160 trains per hour out of the city. With visual signaling 136 trains per hour in each direction will be possible.

With the completion of the rapid-transit plans the actual rush-hour capacity of the whole system in all directions to and from the city will be 280 trains, or 336,000 passengers, per hour, 200 of these trains passing through Wynyard Square Station. Based on the daily distribution of railway traffic that obtains in all large cities, the evening rush-hour traffic is about 15 per cent of the total daily traffic (in Sydney at the present time it is $14\frac{1}{2}$ per cent), and 336,000 passenger journeys during the rush hour would, therefore, represent a total daily number of passenger journeys in both directions of 2,240,000, or a yearly number of 759,000,000 journeys, reckoning 339 days to the year. This is practically double the number of passenger journeys by railways, tramways and ferries for the city of Sydney as of date of the report. It amounts to 544 rides per head of population per annum. This is abnormally high as compared with other cities and is due to the fact that many of the passengers at present change from the trains at Central Station and from the ferries to the tramways and are thus duplicated in the returns. However, since the normal number of rides per head of population increases as the population increases, it may be assumed that the average number of rides per head of population per annum will average 500 by the time the system is worked up to capacity. According to the present growth in population this point should be reached about the year 1935 if all passengers are provided with seats during the rush hour. If allowance is made for two seated passengers to each standing passenger, the two-track loop of the City Railway should suffice until about the year 1950, and attention is called to the fact that, on the subways of the United States and Europe between 26 per cent and 33 per cent of the passengers obtain seats during the peak.

PERMANENT WAY AND EQUIPMENT

The most prominent feature in connection with the permanent way is the use of high-level bridges for crossing the estuaries to the north and west of the city. Bridges were adopted in place of subways under the harbor primarily on the grounds of cost, and the report states that foreign engineers freely expressed the opinion that a proper selection had been made in recommending a one-span bridge in preference to a subway and also in recommending the cantilever type of bridge with horizontal lower chord in preference to the somewhat cheaper design with curved lower chord. The plan of purchase for these bridges is to have alternative tenders submitted, for local manufacture and for im-

portation, on plans and specifications that fix the essential features only and leave the details of construction and the choice of steel to the tenderers, the successful tenderer to complete the working plans to the satisfaction of the purchaser.

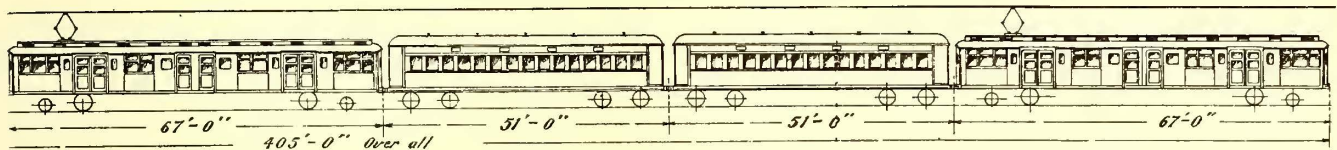
For electric operation the use of direct current at 1500 volts has been adopted, and the report discusses at length whether this should be supplied to trains by overhead wire, by third rail or by both. The additional cost of providing headway in the subway for overhead construction is estimated at about \$1,000 per mile. In addition the overhead wiring will probably cost the same amount more than third-rail construction. However, the amount involved would not warrant the adoption of a third-rail on the City Railway because this would always be a source of danger alike to employees and to the public.

On the suburban railways the overhead construction would cost about \$2,000 per mile more than third-rail construction if there were no other considerations, but the adoption of third-rail would mean that in many places the space between the existing tracks would have to be widened to provide room for the third rail and would involve heavy costs. When all things are considered, overhead construction estimated at \$10,000 per mile of single track would not cost more than third-rail construction and would afford the advantage of absolute safety. In consequence, a double trolley wire of hard-

the outset a one and one-half-minute service each way on the subway loop, a three-minute service to the eastern suburbs, a six-minute service to the western suburbs, and the present service (electrified) on the suburban zones of the steam railroads. As the initial service is increased the demand will be increased to an ultimate figure of the order of 200,000 kw.

With regard to cars for the new service the report states that the end-platform type of car now in use in the Sydney suburban service is quite unsuitable. The movement into and out of the car along the long center aisle is too congested and slow, the end doors do not afford sufficient facility for entrance and exit, and the platforms take up space which could be better used for accommodating passengers. Also, the type of car that is to be used on the Melbourne suburban railways when these are electrified has nine sliding doors on either side, and this would be detrimental to quick starting and would reduce the carrying capacity of the car. In consequence, the recommendation is for the use of an all-steel car similar in dimensions in seating capacity and door space to the equipments designed for the New York Municipal Railway. This car is cited in the report as the most desirable design in rapid-transit service to-day on grounds of efficiency, safety and economy. It has been described in several past issues of the ELECTRIC RAILWAY JOURNAL.

All new cars are to be fitted with two motors, one



SYDNEY RAPID TRANSIT—ARRANGEMENT OF FOUR CARS OF SEVEN-CAR TRAIN MADE UP WITH PROPOSED NEW TYPE OF MOTOR CARS AND EXISTING STEAM-RAILROAD CARS USED AS TRAILERS

drawn copper is to be used. This will be supported from a catenary messenger cable, which in turn will be supported by structural steel brackets and will be provided with double insulation.

The use of direct current at 1500 volts was decided upon for several reasons, the report stating that, in the United States, several single-phase railways have been converted to high-tension direct-current railways, but in no instance has a high-voltage direct-current railway been converted to single-phase. Rolling stock equipped for single-phase is 20 per cent heavier than that equipped for direct current, and the staff required for inspection of equipment is approximately doubled. Where traffic is very heavy, as on a suburban railway, the large working expenses of single-phase systems more than counterbalance the additional first cost of the substations and transformers required for direct current, although where the traffic is less frequent and of a heavier character, as on trunk lines, the single-phase system may prove the more advantageous. However, in view of the exigencies of the immediate problem, direct current at 1500 volts is considered to be the best for the entire system.

POWER EQUIPMENT AND ROLLING STOCK

Power for the new lines is to be generated at the existing station at White Bay by units not exceeding 15,000 kw. capacity, operating at 11,000 volts, 25-cycle, three-phase, and having steam pressure at 200 lb. per square inch or more. The new units, which will have for the initial installation a total capacity of 90,000 kw., will be tied in with the existing equipment that supplies the present tramway system with power. This initial demand of 90,000 kw. will be required to give at

over each truck. It is possible that the cost of transportation and the high tariff in Australia will necessitate units consisting of a four-motor car and a trailer, which would save about \$1,200 per car, but eventually, the advantages of having all cars equipped with motors are expected to outweigh the additional first cost. It is estimated that about 360 motor cars of the New York Municipal Railway type will be required at the outset to provide for the estimated railway passenger traffic and a reasonable margin for immediate growth. The existing rolling stock is to be used as trailers for these motor cars in seven-car trains, four trailers to the train, and as trailers for steam locomotives, since a steam service will have to be maintained to and from Central Station until the inner and outer zone suburban traffic is electrified. When the existing rolling stock has reached the limit of its usefulness it is to be replaced preferably by motor equipment.

Reduction in Accidents Effected by Door Control Mechanism

At a recent meeting of the Public Service Commission it was testified that between July and December, 1913, the Third Avenue Railway of New York reported 1457 boarding and alighting accidents in the transportation of 65,830,328 passengers. In 1915 for the same length of time between January and June, when the cars were equipped with folding doors and steps, 434 similar accidents were reported in the transportation of 66,853,831 passengers. This decrease of about 24 per cent of the total number of accidents is attributed largely to the use of doors interlocked with the control circuit.

Procedure in Chicago Elevated Valuation*

Author Describes the General Plan Followed by Chicago Traction & Subway Commission in Laying Basis for Unification—Interesting Details Are Given for Various Official Accounts

By F. J. BACHELDER

Consulting Engineer, and Valuation Engineer Chicago Traction & Subway Commission

THE ordinance of Jan. 31, 1916, directed the Chicago (Ill.) Traction & Subway Commission to develop a financial plan as a basis for the unification under one management of the surface and elevated lines, and, if necessary, to place a valuation upon the properties of the elevated companies. In the financial plans developed by the commission in accordance with the instructions of the ordinance, the value placed upon the elevated railroad properties is used as the figure to be added to the purchase price of the surface lines, as fixed by the 1907 ordinances, together with new capital supplied by the companies, to form a new purchase price for the entire consolidated and unified system.†

GENERAL PROCEDURE IN FIXING COST OF PHYSICAL PROPERTY

Reproduction cost new of the property was fixed as of June 30, 1916. To the construction cost thus obtained there were added carrying charges, interest and taxes during construction and allowances to cover the engineering, contingencies, legal, administrative, and all other preliminary expenses of the company, as later detailed. After establishing the cost new of the property, it was depreciated, according to age and physical condition, the result thus produced being its present value.

Construction Period and Unit Prices:

Three years was determined upon as a reasonable average period for the construction of the whole property. An extensive study of the market quotations on material indicated that a ten-year average was the fairest basis of price for the fluctuating items. As far as it was possible actual contract costs were used. From study of the diagrams on page 387 showing the range of copper and structural steel prices for the last twenty years, can be seen the reasonableness of choosing this average. These diagrams are representative of the market trend of other materials.

Depreciation and Scrap Value:

Depreciation in most items was determined by the straight-line method. Where the material entering into the structure had a scrap value, depreciation was only applied to the wearing value, or difference between the scrap value and the cost new.

Scrap prices of material were obtained from market quotations and ten-year averages of market prices. The cost of handling or dismantling was deducted from the scrap prices, the difference representing the net salvage value applied. In determining salvage values of structural steel, it was assumed that an acetylene torch would be used for cutting the metal apart and a locomotive crane for loading the dismantled structure into cars.

Salvage values of rolling stock were obtained by applying the ten-year average market price of the various metals obtained after dismantling the cars and deducting the cost of labor of dismantling. Actual weights of the metals obtained in each class of equipment were used. Wooden car bodies received no salvage allowance. This method resulted in the following weighted average salvage value, expressed in per cent of cost new: Wooden cars—motor, 2.6 per cent; trailers, 1.7 per cent; composite cars—motor, 3.2 per cent; trailers, 2.1 per cent; steel cars—motor and trailers, 3.6 per cent. A salvage value for power station equipment was applied at the rate of \$1.50 per kilowatt on the manufacturers' rating of generating units.

Following is a table giving the ten-year average market price for scrap and salvage value of the metals involved in this valuation (cost of dismantling has been deducted in each case):

	Scrap Price	Salvage Value
Aluminum	17.13c. per lb.	16.24c. per lb.
Copper—wire	14.28c. per lb.	14.28c. per lb.
Copper—heavy cut	14.73c. per lb.	12.93c. per lb.
Lead—heavy scrap	4.29c. per lb.	4.24c. per lb.
Steel—heavy melting	\$12.50 per ton	\$3.75 per ton
Rail—running and third-rail....	\$14.50 per ton	\$12.18 per ton
Frog and switch scrap.....	\$12.50 per ton	\$12.50 per ton

Life of Structure and Equipment:

The life of structures and equipment was taken to be dependent upon physical wear, decay, obsolescence and inadequacy. In addition to the life of equipment or structures whose useful life was determined by physical wear, obsolescence or inadequacy, the per cent condition of some parts of the property was determined from inspection where unusual conditions made such a method necessary, as described under special work.

Contingencies:

To cover omissions and miscellaneous construction costs where it was not possible to identify such costs in detail, 5 per cent was applied on the cost to reproduce new. Such costs were depreciated along with other costs.

Plant Development Costs:

Plant development costs were allowed where actual money was spent in perfecting the more permanent physical structures not subject to frequent renewals. This includes such items of expense as raising the structure where steam roads carried out track elevation work, including the cost of the temporary structure, where such temporary structures were necessary for keeping the road in operation, but not including the cost of structural steel or foundations. This cost was placed at a reasonable figure to cover such expense. Expenses incident to improving car equipment and other similar items were not included.

DETAILS OF VARIOUS ACCOUNTS

In addition to the foregoing remarks concerning the general procedure followed in the valuation of the ele-

*Abstract of paper presented before the Wisconsin Engineering Society at Madison, Wis., on Feb. 15.

†The general conclusions of the Chicago Traction & Subway Commission in regard to the valuation of the elevated properties were published in the ELECTRIC RAILWAY JOURNAL of Dec. 23, page 1297.—[Eds.]

vated properties, it might be interesting to point out certain details of some items in the official classification of accounts.

Engineering and Superintendence:

For the item of engineering the following percentages were applied: (1) Two per cent upon the value of the total rights-of-way, lands used and useful in operating the road, buildings and easements, this engineering not being considered depreciable. (2) Five per cent on the reproduction cost new of physical property other than rights-of-way, buildings and easements, plus the item of contingencies.

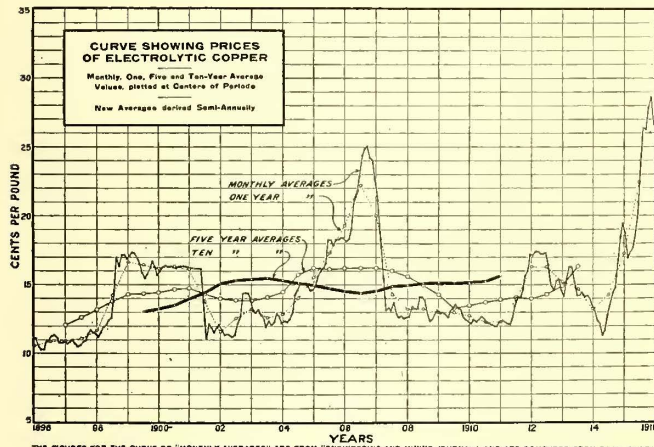
Right-of-Way—Acquisition Costs:

To cover costs of condemnation, surveys for titles, securing abstracts and titles, commission on real estate purchases in acquiring lands, buildings, leaseholds and special assessments for local public improvements dur-

tions as to loose bolts, sheared or loose rivets, condition of stops and hold downs, and other parts of the frog. A wear of 0.5 in. at the point of the frog was considered the maximum allowable, and the condition taken from measurements was determined in proportion to the amount of wear in each case. The same method was used in determining the condition per cent of crossing frogs. Condition per cent of switch points was determined by the amount of wear to produce a blunt switch point, which would be unsafe to operate or keep in service on account of the danger of catching wheel flanges. Fastenings, guard rails, etc., received the same life as frogs and switches to which they were applied.

Elevated Structures and Foundations:

Structural steel of the elevated railroads was classified as follows: plate girder, incline, truss girder and truss bridge construction. Average costs per ton were determined for each type of construction, a base price



CHICAGO VALUATION-CURVE SHOWING TWENTY-YEAR PRICES OF ELECTROLYTIC COPPER

ing the construction period, an item of 10 per cent was allowed on the naked land value of all lands owned and used or useful for railroad purposes, together with buildings and excess value of leaseholds.

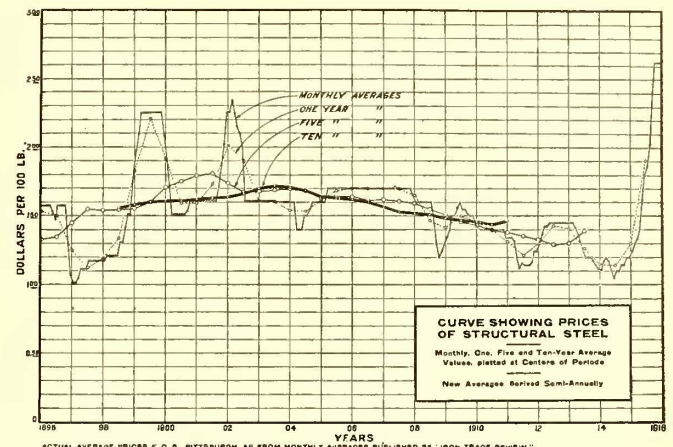
Rails, Rail Fastenings and Joints:

Studies were made of rail wear, both on curves and tangents, with a view of determining the life. Sections showing wear of rail for various degrees of curve and life were taken at eighty-two locations with a railograph machine, supplemented with caliper measurements. In taking these sections of running rail, showing wear, representative points were chosen; that is, sections in either the center or quarters of the rail length, avoiding points where the track was out of line. Diagrams were prepared for curved track on main line and branch line curves, and the data on wear were found to be reasonably consistent. Track fastenings were figured with the same life as the rail to which they were applied in each case.

Special Work:

A condition per cent of the special work was determined from measurement and inspection, as the records of installation of these items were not complete enough and the traffic conditions varied so greatly that a uniform life could not be placed on each type of construction. Instead, information was gathered from measurements of the wear on the various items making up the special work.

The life of frogs was determined from the amount of wear on the face and points of the frog, at the same time consideration being given to the general condi-



CHICAGO VALUATION-CURVE SHOWING TWENTY-YEAR PRICES OF STRUCTURAL STEEL

being used for structural steel shapes, determined from average market prices for the ten-year period ended June 30, 1916. Following are the unit costs as placed in the valuation of structural steel as erected: Plate girder construction, \$69.50 per ton; truss girder construction, \$72.20 per ton; truss bridge construction, \$73.50 per ton, and incline construction, \$71.50 per ton. Depreciation on the elevated steel structure was based on a life of 100 years.

Distribution System:

Depreciation of third rail was determined entirely from the wear from contact shoes. The limit of wear was chosen as representing, in actual practice, the average to which third-rail is worn, and this formed the basis of the condition per cent as used. In order to obtain representative limit of wear, sections were taken with a railograph machine at least 300 ft. from stations, and where trains were under power. To ascertain that the graphs were really representative of the average condition of the rail, a series of caliper measurements was taken of the rail heights at intervals, the mean of which heights checked the mean of the rail graphs within one-sixty-fourth of an inch.

Depreciation of overhead trolley is almost wholly due to the wear from the trolley wheel. Condition per cent of the trolley wire was determined from actual measurements in the field, on the assumption that any trolley becomes dangerous to operation when the trolley section falls below 100,000 circ. mil. Tables were prepared to show the data obtained and the condition per cent as determined from the measurements made.

From an examination of aluminum cable actually re-

moved from the elevated railroads this year, a life of twenty-five years was adopted for all bare aluminum cable. Contrary to general opinion, bare aluminum cable on being removed showed serious effects from the action of the elements. Studies of depreciation of bare copper cable showed that no actual physical depreciation occurred or could be measured in the case of negative and positive feeder cables. Strands of these cables were carefully measured with a micrometer caliper, and they did not show any appreciable reduction that could be thus detected in the area of the section as a result of exposure to the elements.

Passenger and Combination Cars:

This item covers all the parts and equipment of rolling stock except the motor and control equipment. Consideration was given to the type of the car and the class of materials entering into its construction, and the value obtained was the result of the detailed analysis of the cost according to the specifications for each type, fair average prices being used. A study of the physical condition of the cars was made, the study including an examination especially of wooden and composite cars. In some cases siding was stripped from the passenger cars to reveal the physical condition and decay of the sills and other parts. Furthermore, an examination of the interior finish, trucks and other parts was made. As a result the following lives of rolling stock were assigned: Wooden cars, forty years; composite cars, forty-five years, and steel cars, fifty years.

Power Plant Buildings and Equipment:

Power plant buildings were valued on a cubic-foot basis according to the character of construction. They received a life of sixty-six years, and were depreciated on this basis. Where buildings were on special foundations, the value of such foundations was added. Included in this account are the water tunnels from power plants to various sources for condensing water supply. These were estimated on the basis of the cubic yard of brick work and excavation and were depreciated on the basis of a 100-year life.

Values of power-plant equipment were obtained from manufacturers' prices and the experience of the commissioners and staff, and they included the cost of installation. Salvage values of the equipment were assigned from actual sales of similar equipment. Most of this equipment of the elevated railroads has been leased to and is operated by the Commonwealth Edison Company, which in turn furnishes the power for operating elevated trains. While these plants are not of the most modern design, they are serviceable for the peak-load operation required of them. On this account they received a life of ten additional years; that is, a total life of from twenty-five to thirty-two years.

Substation Equipment:

Values of substation equipment were obtained in the same way as those of power-plant equipment. Electrical equipment, such as rotary converters, boosters, etc., received a life of thirty-three years. Batteries had a condition of 80 per cent, which represents a fair permanent condition under their maintenance guarantee. Salvage values of the batteries were obtained by applying a ten-year average market price of the scrap metals in the battery plates, busbars, tank linings, etc.

Franchises:

No allowance was made in the valuation for the value or cost of obtaining franchises. The commissioners considered the franchise value of the elevated railroads taken as a whole, purely upon the basis of their combined earnings, as properties continuing to operate in

competition with the present and future surface lines. While some of these roads, taken separately, might have a franchise value, yet, when all the roads were considered collectively as a single property, no franchise value was found and no allowance was made. This item was left for consideration by the City Council.

Interest and Taxes During Construction:

It was assumed that before the construction was started practically all of the right-of-way had been acquired, and that it was, therefore, necessary to pay interest at 6 per cent on the real estate investment for the whole three years of the construction period. This interest was applied on the total value of right-of-way and buildings. For the other physical property it was assumed that it would be necessary to pay interest on the value of the property for one-half of the construction period. Interest at the same rate was also allowed on the amount of taxes actually paid during construction.

Taxes were assumed to be paid on right-of-way and other land from the beginning of the construction period. Taxes on other physical property were assumed to be paid on one-half of the value of the property. The tax rate was determined from actual tax rates paid in Chicago for the year 1913-1914 and 1915. An average for the various city districts through which elevated railroads were constructed was found to be 18.63 mills per annum.

Miscellaneous:

This account includes expenses of a special or incidental nature prior to or during construction, such as preliminary expenses, promotion expenses, organization expenses, preliminary right-of-way expenses and insurance.

Insurance during the construction period must be paid on buildings and structures turned over to the corporation by contractors prior to the full completion of the road. To cover this cost 0.069 of 1 per cent was allowed on \$46,159,555, or the reproduction cost new of other physical property plus contingencies. This expenditure was regarded as not depreciable.

After obtaining the aggregate cost of total right-of-way and other physical property, including easements, plant development costs and all incidental percentages, the commissioners concluded upon an "agreed general allowance of 11 per cent on the sum of all previous items (\$73,664,666) to cover all items, which in the absence of specific information as to the actual costs thereof to the company it was not possible to determine separately in connection with the organization of the companies and the development and production of the complete operating property, such as preliminary, promotion, organization and financial expenses and working capital." This item of 11 per cent for the general allowance was depreciated at the same rate as the total property was depreciated.

Materials and Supplies:

Book inventories furnished by the elevated railroads of the materials and supplies in the storehouses and on the line of road were accepted for the purposes of this valuation. A comparison was made with book values for the last two or three years, and the total of this account checks reasonably with stocks of previous periods. It was felt that the expense of making a detailed inventory of materials and supplies was not justifiable at this time, as this should be done when final consolidation takes place. No allowance was made in this account for engineering drawings, which represent a considerable expenditure, as this cost was included under the account of engineering.

Recent Tendencies in Taxation*

Author Discusses Changes in Revenue Producing Methods—Criticizes Various National and New York State Tax Laws—Railways Should See That Money Raised Is Spent Wisely and Economically

By R. L. RAND

Vice-President Richmond Light & Railroad Company, New Brighton, N. Y.

FROM the primitive condition under which the poll or capitation tax was general, progress has been made by halting and unequal steps through various forms of property taxes, consumption and privilege taxes and latterly income and inheritance taxes. The poll tax failed because it ignored the unequal distribution of wealth brought on by conditions of advancing civilization. Substitution of the property tax, on the theory that the more property possessed the more able was the possessor to bear a portion of the public expense, was a step forward. But the unfairness of this method evidenced itself as forms of personal property multiplied, for in laying an equal burden on all property according to its value, the general property tax ignored the varying rates of income produced by different classes of property. The next expedient was the consumption tax. As a regulatory or police measure in the form of an excise on liquor or tobacco, this is successful, but as a revenue producing measure it is the most unfair of all taxes. The injustice results from the fact that it takes no measure of ability to pay. Then, too, a tax paid with open eyes is morally and economically superior to one filched in dribbles. Thus one comes to the present tendency to shift taxation from things to faculty, from property to income.

PUBLIC EXPENDITURES ARE GROWING

The changes in the method of securing public revenues are the result of logical development that is only being hastened by current events. The object lesson of the great war has brought on the preparedness movement with its corresponding huge increase in expenditures for the army and navy. The Mexican situation has caused a large expenditure. The rapid assumption of new functions and duties by the government, the purchase of the Danish West Indies, and huge new public works planned and under way are introducing a new era. The country will have and continue to have taxes such as have hitherto been unknown. With many of the expenditures that are causing the increased demands, we are thoroughly in sympathy, but it is our duty to see that the money raised by the new levies is spent wisely and economically. Extravagance in public administration is encouraged by the lack of attention given it by business and business men.

UNDESIRABLE TAXATION METHODS

One of the most pronounced manifestations of the new tendency is the increasing of the rate of return on the income tax from 1 per cent to 2 per cent. In doing this Congress played politics and left the farmer secure in his practical immunity from the tax. This was indefensible class and sectional legislation. Then, too, the exemption should have been lowered before any increase in the normal rate was made. An exemption of \$2,000 with an additional \$500 for each dependent would not only result in increased revenue but also would work out more justly than the present flat exemptions of

\$3,000 and \$4,000. If in addition to this change the farming element were required to bear its fair portion of the public expense, the increase of rate would have been unnecessary.

In the act of Sept. 8, 1916, Congress is experimenting with some hitherto untried sources of revenue. In one case it has been guilty to some extent of breaking its faith. I refer to the new capital stock tax. This is, in effect, as far as a profitable business is concerned, an additional tax on income, for it is income-producing ability or earning power that establishes the value of non-speculative stocks such as those of street railway companies. The real objection to the capital stock tax is that it taxes unprofitable corporate business. This is where Congress has broken its faith, for in debate on the original income tax act of 1913 Congressman Hull, who wrote the act, said: "In any event the proposed tax is measured by net profits or gains and is not imposed upon gross income or capital or other property. If a citizen has not been successful in his efforts to accumulate profits, he is not required to pay the tax." Now, however, corporations in contravention of Congressman Hull's remarks are required to pay a tax whether or not they have been successful in accumulating profits. As one authority has expressed it, "corporations are not supposed to be voters, and this may be the reason for the abandonment of principles . . . expressed with so much eloquence."

One proposition for increase in federal revenues that has raised its head quite too often of late is that to tax inter-state commerce. Such a tax would be burdensome in the extreme. Railways must of necessity distribute their purchases over the country as their multitudinous requirements are produced in many different states. A tax placed on interstate commerce would be equivalent to a tariff wall at the border of every state, and would result in materially increased expenses of operation. This prospect we can only regard with the gravest concern and apprehension.

RECENT TENDENCIES IN NEW YORK

As at present interpreted, the net earnings rule, applied to determine the intangible values of railway franchises in New York State, penalizes the luckless investor who is unfortunate enough to have money in a street railway. It, in effect, says to the stockholder, "You may earn 6 per cent on the capital you have invested but no more. If you earn more, it will be taxed away from you, and if you earn less, it is your own concern and your own loss." This is a condition that may not yet have been brought home to all railway operators, but it will be the next time they have to seek new capital for improvement or expansion.

If a balance were maintained by allowing the intangible portion of the franchises to have a minus value when operation under them was proved to be unprofitable, there would be less unfairness in the interpretation. The public demands that service once established be continued whether or not it is profitable. Why is it radical to suggest that they indirectly pay part of the

*Abstract of a paper presented before New York Electric Railway Association on March 2, 1917, in New York City.

loss of that service through a credit on the tangible value of the franchise for the negative intangible value? If the service were maintained directly by the public, they would have to pay for its losses through the medium of increased taxes. It is true that railways in common with other public utilities owe a certain debt to the community in which they operate. Yet the public owes a debt to street railways. Look at the property development that has been caused by increased transit facilities. The capital for those facilities had to be hazarded in the hope that profits would result. Sometimes they failed to materialize. Then who stood and is standing the loss, the public or the investor? Where, then, is the unfairness in the suggestion that the public stand some of the loss on unprofitable service maintained for their benefit?

As for other benefits to the public from the operation of street railways, there is snow removal. The municipality leaves to the plows and sweepers sent out to clear the railway tracks the entire burden of maintaining a passage through its residence streets. Then there is paving. Why the railways should continue to install and maintain paving for decades after the discarding of horse cars is beyond my comprehension of justice. The paving now is for the use and convenience of automobiles, trucks and jitney buses. This burden should be transferred to them. I do not mean to contend that the railways should not replace in its original condition paving torn up when making repairs or extensions of their tracks, or that they should not bear their just proportion of the total cost of paving equally with other taxpayers and property owners. But when it is decided to change the style of paving or to replace it when worn out (to which wear they have not contributed), no portion of the expense should be charged to them.

Although it is a digression, I would like to mention here the fact that in a report to the 1917 Legislature by the Massachusetts Public Service Commission, it was recommended that "cities and towns should relieve railway companies of unjust and unnecessary burdens of street maintenance." This is the most encouraging incident I have heard of for some time. If only our New York State public service commissions would emulate the example.

Not only is the compensating benefit of paving not considered, but the State Tax Commission actually penalizes the railways for their compliance with franchise obligations. For in figuring the intangible value of franchises, it allows an earning capacity of 6 per cent on all property excluding paving. And in doing so it has been sustained by the courts. When it is considered that companies could use the capital now invested in paving in buying equipment which would benefit their patrons more directly through the improvement in service secured, it seems that the taxing power is following a short-sighted policy in continuing the obligation and penalizing railways for complying with it.

CENTRALIZING ASSESSMENTS

The creation by the Tax Department in April, 1915, of the bureau of special franchises to give individual attention to this important subject was in a way a measure of relief, more in potentialities, however, than in actual accomplishments up to the present time. One important phase of their work needs especial missionary effort on our part. I refer to the subject of valuation. Their methods at present are exceedingly crude and in addition disagree with those in use by the Public Service Commission. We now suffer by this disagreement in both taxation and rate cases. It would seem logical that the work of these two divisions of

the State government be co-ordinated in the interest of justice.

The very establishment of the Tax Commission was a tendency toward centralization of assessment. It is to be noted with encouragement that the commission is aiding in the development of that tendency. Last year for the first time the companies were provided with a report to be filed in duplicate. This was a summary of real estate owned, and the duplicate went to the local assessor. We should be glad to see the day when the local assessor is eliminated and the State Tax Department entirely assumes his work. The possibility of getting a fair assessment roll would then be considerably increased. When private property, now assessed at a low rate through political influence, is brought to contribute its fair share of the expense of government, a partial relaxation of the pressure on incorporated business will result.

This tendency toward centralization took its most pronounced step forward in Ohio in 1913, when the Legislature provided for the assessment of all property by the central tax authorities. This law was a little too progressive, however, and was repealed two years later. It is believed that its repeal was largely due to political influence and not to dissatisfaction with its workings. As such, it was only a temporary setback. The law still stands as a sign of the times showing the tendency toward equalization of assessment.

REPORT OF NEW YORK CITY COMMITTEE

The final report of the committee on taxation for New York City, submitted in January, 1916, is worthy of mention as indicative of recent tendencies. In reporting against untaxing buildings it puts, one hopes, a final quietus on the single tax theories of Henry George. For that theory means practical confiscation of railway-owned realty and the taxing of franchises at a rate far higher than at present in vogue. Even the single taxer does not "let up" on the public utility, but expects it with land to provide all revenue necessary for the government.

The recommendation that municipal income taxes and occupation taxes be substituted for the personal property tax is well in accord with recent developments. For the personal property tax falls into that old error of ignoring the varying rate of return on different classes of property. The sanction of a tax on increments of land values is a dangerous inconsistency. It is a sort of half-compromise with the theory of a super-tax on land which the same report refuses to endorse.

But the section of the whole report which engages one's most earnest attention is that calling for repeal of Section 48 of the tax law, providing for the deduction from a special franchise tax of the amount paid by the owner as rental for the franchise and any sums paid which are in the nature of taxes, such as car licenses, etc. One electric railway has already been the object of special attention, a law having been passed preventing the deduction of bridge tolls from the franchise-tax payment. Now it is recommended that this treatment be extended to include all utilities. An especial hardship would be worked on companies which are paying old village or town franchise taxes under original grants. At present these are deductible. The repeal of the section would in many cases almost double the tax imposed and would tax the railway twice for the same privilege.

Consideration of evidence from all quarters leads to but one conclusion, *i.e.*, that for all street railway executives the consideration of tax matters is of prime importance. In earnest co-operation lies the only hope for the future.

Redeemable Cash-Fare Receipts*

Cash-Fare Receipt with Redemption Value in Proportion to Fare Would Check Train Cash-Fare Collections—With Ticket Having Receipt Coupon, Chances for Manipulation Would Be Reduced to Minimum

By R. W. PALMER

General Manager Auburn & Syracuse Electric Railroad, Syracuse, N. Y.

ONE of the most difficult problems confronting the management of an interurban railway is the proper and accurate checking of passenger fare collections. Provided all train fare collections were in the form of tickets, the proposition would be very much simplified. On account of the very nature of the business, however, interurban cars make frequent accommodation stops at points along their line, in addition to the regular station stops where ticket agencies are maintained. As it is impracticable to maintain ticket agents at all stops, a considerable portion of their business is on a cash-fare basis, especially when the cash-fare and ticket rates are the same.

CASH-FARE RECEIPTS SHOULD HAVE FACE VALUE

The proper accounting for cash-fare collections has been recognized by railway managers as a weak link in their system, and a number of devices and methods have been tried out and adopted. The two most widely used are the register and some form of cash-fare receipt, the purpose of this paper being to deal with the latter. In the writer's opinion a cash-fare receipt to have any auditing value must have a face value, so that the passenger receiving such receipt will save it and turn it in for redemption in place of throwing it on the car floor.

Did you ever notice anyone throw away trading stamps or tobacco certificates? If you did, you can rest assured that they will soon be picked up. Even though the value of these certificates is extremely small, they are always saved and a customer is careful to note that the value of the certificates received is in direct proportion to the amount of money expended. The trading stamp and certificate issuing proposition has a bearing on the subject of cash-fare receipts in showing that if the receipt has a value it will be retained and cashed in.

REDEMPTION VALUE SHOULD NOT BE FIXED

In order to induce the passenger to retain and turn in his receipt so that the company may use it for auditing purposes, some electric railways and a large number of steam railroads charge an excess of 5 cents or 10 cents covering all cash fares paid on trains. This amount is refunded on surrender of the receipt to any ticket agent of the company. Where this system is in use the company secures the return through their agents of a large percentage of the receipts issued, as shown by the fact that four companies have secured returns of 97 per cent, 95 per cent, 94 per cent and 88 per cent.

Fixing the value of the receipt at 5 cents or 10 cents is all right as far as it goes. Inasmuch, however, as each receipt has the same redemption value, there is no special incentive on the part of the passenger to see that the receipt indicates the exact amount of fare collected, or that it properly indicates the stations between which such fare is paid. This is the point in which we are all most interested. In or-

der to accomplish the desired result, the redemption value of the receipt should increase in direct proportion to the amount of fare paid.

On a mileage basis this could be handled very nicely by adding a fraction of a cent per mile to the fare collected, which amount could be refunded on surrender of the receipt. For example—provided the ticket fare is 2 cents per mile, the train fare could be made 2.5 cents per mile with a refund of 0.5 cent per mile on surrender of the receipt. Where the 5-cent zone system is used, 1 cent could be added to cover each zone collected. In other words, the train fare for any distance covered by a 10-cent ticket fare would be 12 cents with a 2 cent refund, etc.

The receipt issued by the conductor should be in the form of a duplex so arranged that the amount of refund would appear directly opposite the amount of fare paid. In this way the passenger would know the exact value of the receipt. This arrangement would also show the agent at a glance the amount to be refunded, and the receipt would be handled as cash and turned in by the agent as such with his remittance, after having been stamped "Redeemed."

Along the same lines, I understand that a certain company handling patented cash-fare receipts has in the course of development a system whereby the exchange value of the receipt increases in proportion to the amount of fare paid. The company purchases useful articles of merchandise and sells them direct to the holders of cash-fare receipts at the wholesale cost plus a certain number of cash-fare receipts, as specified in a catalog. Under this plan an amount equivalent to the difference between the wholesale and the regular retail selling price of the article has been paid in cash fares to the railway. For example, a pot-type coffee percolator, standard make, with a regular selling price of \$8, would be delivered for \$5.04 in cash and a sufficient number of cash-fare receipts, indicating that \$2.96 or more had been paid for transportation. The receipts redeemed in this way would be turned over to the company for auditing purposes.

AUDITING CASH-FARE RECEIPTS

In connection with the auditing of cash-fare receipts which have been turned in on account of their refund value, it is not absolutely necessary that each receipt be matched up with the conductor's stub bearing the same serial number, as by picking out any particular month and matching up all the receipts turned in with the stubs a reasonable check can be made. As the receipts are collected from the agent and audited as cash, they can be separated as to the months they were issued. As the conductor's stubs would also be filed under the heading of each month, a check could be made as often as deemed advisable.

TICKET SALES INCREASED

In addition to safeguarding the cash-fare train collections, the rebateable receipt tends to induce passengers to purchase tickets at agencies along the line,

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thereby eliminating to a great extent the cash handled on the cars and allowing the conductor more time to look after the operation of his train and the comfort of the passengers. This is shown by results obtained on the Cleveland & Erie Railway, Girard, Pa., which property the writer operated up to June 15, 1916. On this road the division of fares for June, 1913, was 49 per cent cash and 51 per cent ticket collections. On Dec. 1, 1913, the rebatable cash-fare receipt (Macdonald System) was adopted, after which time the ticket sales increased so that for June, 1915, the division was on the basis of 67 per cent ticket collections and 33 per cent cash fares handled on the cars, an increase of 18 per cent in ticket sales. On another property, prior to adopting the rebatable cash-fare receipt, the cash-fare collections amounted to 80 per cent of the total fares collected, while under the new system the ticket fares run approximately 80 per cent of the total collections.

NO HARDSHIP TO PUBLIC

The argument is sometimes advanced that a passenger boarding a car at a non-agency station should not be required to pay an increased fare over the passenger who on account of living near an agency station has an opportunity to purchase a ticket. This argument implies that there is a discrimination, or that the passenger is penalized by being required to pay the increased rate. The majority of interurban roads, however, have reduced forms of transportation, mileage and commutation books on sale at all ticket offices, which can be purchased for a few dollars. In addition to placing on sale at agencies regular card tickets covering points between which travel is frequent, a special blank or punched form of ticket could be sold by agents entitling the holder to travel between any two points which may be indicated on this special ticket at a rate of 2 cents per mile for the distance actually traveled, the minimum fare in all cases being 5 cents. The above forms of transportation should be sold with a liberal expiration-date allowance, or preferably with all time-limit restrictions removed.

Provided a railway maintains a reasonable number of ticket offices where tickets can be purchased for use between all points on its line, and also has on sale mileage and commutation books, it cannot be considered a hardship on the traveling public to collect a slight increase per mile covering all cash fares collected on trains, if this difference is refunded to the passenger on surrender of the receipt issued by the conductor. The whole intent of the rebatable cash fare receipt is to have the receipts returned for auditing purposes, as it is not the desire of the company to increase its revenue by making a difference in the train fare collections over the regular ticket rate.

In addition to the redeemable cash-fare receipt and as a further protection to prevent the possible manipulation or reselling of uncanceled tickets, all tickets could be made with a detachable receipt to be detached by the conductor and turned over to the passenger as a hat check, such tickets being void if presented for passage with coupons detached. Conductors would be instructed, however, to punch both ticket and coupon so as to prevent any possibility of the passenger attempting to use an old receipt, in which case the conductor's punch mark would be of value.

The issuing of a cash-fare receipt having a redemption value which increases in direct proportion to the amount of fare paid would serve as an absolute check on all train cash-fare collections over 5 cents. Provided a ticket having a receipt coupon is also used, it would seem that the chances for manipulation of cash fare or ticket collections would be reduced to a minimum.

Indemnity and Surety Bonds*

Expert Explains Bonds Conditioned Upon Fidelity of Employees and Bonds for the Performance of Contracts

BY WILLIAM N. TOMLINS

Vice-President American Surety Company, New York, N. Y.

THE surety business, though still in its infancy, has grown to large proportions during the past decade. Those branches of the business which most concern electric railway officials are what we know as fidelity business and contract business; that is, bonds conditioned for the fidelity or honesty of a principal and bonds conditioned for the performance of contracts to construct some piece of work.

There are substantial differences between suretyship and insurance. For instance, insurance may be oral, but suretyship for another must be in writing. By insurance, the insurer takes the hazard without expectation of indemnity, while in suretyship the surety in every instance has the right of recovery from his principal. In insurance there are only two parties, the insurer and the insured, while in suretyship there are three parties—the principal, who is or may become a debtor and must indemnify the surety, and the one who is or may become a creditor, and the surety. In insurance the insurer is bound on the happening of the event insured against, while in suretyship the surety is only bound in case the principal fails to discharge his obligation.

FIDELITY SURETYSHIP

In general, the purpose of fidelity suretyship is to indemnify the employer against loss from the dishonesty of an employee. The methods used in judging of the acceptability of an applicant for suretyship are practically the same in all companies. The principal features include the receipt of an application wherein the following information is given: (1) The names of former employers for a period of at least ten years; (2) the names of from five to seven references; (3) information of his financial responsibility, the amount of his salary, his debts and the number of persons depending upon him for support. We also make it a point to inquire about the employer's standing, both moral and financial, and particularly with reference to the safeguards surrounding the employment, the system in use by the employer to prevent losses and the frequency with which the applicant's books are examined.

A source of trouble in the past in connection with fidelity bonds has been the statement required from the employer about the methods of business and the safeguards thrown around the employee. It is necessary for the surety to have something of this kind, but the practice grew up, with some companies at least, of so framing those certificates as to justify the assertion when a loss came that unless the employer had exercised the oversight mentioned the surety could not be required to pay. Experiences have convinced most, if not all, of the surety companies, however, that even in those cases where they take such a certificate it shall not constitute more than a mere statement of the employer as to the methods of transacting that part of business with which the employee is connected. Hence, if through inadvertence some one of those methods is overlooked or perhaps intentionally dispensed with, it will not interfere with the employer's right of recovery from the surety if loss is suffered through the wrongdoing of the employee.

The safety of such a business consists in inducing those who are covered by bonds to believe that honesty

*Abstract of paper presented before New York Electric Railway Association on March 2, 1917, in New York City.

is the best policy and to live and act accordingly. It recognizes the market value of a good reputation, right living, creditable family connections and a good home. It is undoubtedly true that placing an employee under bond throws around him a wholesome restraining influence, for he thus knows that an obligation besides faithfulness to his employer rests upon him.

CONTRACT BONDS

Contract bonds are a prolific source of income to the various companies, and in the last few years have assumed large proportions, both as to premium and losses. In bonds conditioned for the performance of contracts to do different kinds of work, one may be interested from either of two standpoints: the first, where he is required to give a bond, as, for instance, where he is doing the work for someone else; and the second, where he takes a bond from someone who is doing work for or under him, as, for instance, where he sublets portions of a contract.

Curiously enough, the form of bond required has outgrown all proportions, until now one is frequently asked to give bonds conditioned not only for the performance of the contract, but also to protect the owner against many imaginary losses for which he cannot be held liable. The excessive liability of such bonds leads the surety company to charge more, because the terms lead to successive trouble and litigations, all causing unnecessary expense. All this might easily be avoided by simply giving one's bond covering his failure to perform his own contract, which is all that the owner could possibly require.

Contractors of doubtful responsibility sometimes advocate the giving of a bond which shall constitute a direct promise for the payment for materials and everything else to the end that they may buy on credit, finish the job perhaps at a very low figure, collect everything collectible and then decamp. All of this is to the detriment of the contractor who tried to get fair pay for his work and who of necessity must get fair pay to the end that he may meet his own obligations.

Corporate suretyship, whether of the fidelity class or the contract class or otherwise, is far more to the purpose than the suretyship of the individual.

Railway Club of Rochester Meets

The transportation representatives in Rochester, N. Y., covering steam and electric railroads, and express companies and fast-freight companies, have organized under the name of the Railway Club of Rochester. The objects of the club are to promote understanding of railway problems and increase professional and social intercourse among its members.

The club meets on the last Monday evening of each calendar month. Papers on some subject of interest to members are presented by previously designated members and the discussion of the papers is participated in by the members. On Jan. 29, Dr. P. H. Conboy, company oculist of the Buffalo, Rochester & Pittsburgh Railway, presented a paper, "The Selection of Employees for the Transportation Department," and J. E. Burnes, supervisor of car service for the same company, presented a paper, "Per Diem Charges."

The officers of the club are Robert W. Davis, freight traffic manager, Buffalo, Rochester & Pittsburgh Railway, president; S. J. Kearns, superintendent, New York Central Railroad, first vice-president; E. J. Cook, general manager, New York State Railways, second vice-president; J. P. Barnes, general manager, Buffalo, Lockport & Rochester Railway, third vice-president, and E. F. Kelley, purchasing agent, Buffalo, Lockport & Rochester Railway, secretary and treasurer.

Outlook Hopeful Through Publicity and Square Dealing

Addresses in Boston Last Week by Mr. Dreier and Former Governor Cobb of Maine Point the Way Toward Better Public Relations

Electric railway men who attended the meetings of the Massachusetts Street Railway Association and of the New England Street Railway Club at Boston last week went home with renewed courage to attack the service problems, for at each meeting the optimistic note was struck that given frank publicity and square dealing the public utilities are sure in time to win. The Massachusetts meeting Feb. 21 was addressed by Thomas Dreier, assistant to the president Bay State Street Railway, who likened the present financial situation of many street railways to the condition in which Robinson Crusoe found himself after landing upon his island. The whole theory of Crusoe's activity was to use what he had to get what he needed. To-day the street railway is situated on an island surrounded by a sea of legal restrictions. Complete service to the public must be the basis of any success in overcoming the present difficulties. The time has come, the speaker said, for the companies to inculcate the facts relating to their business, notably among their men, and this could well be done through company publications in which officials and employees could express their ideas. The bulletins of the Brooklyn Rapid Transit Company were commended for their frank treatment of transportation problems, courtesy, stealing of fares, poor appearance, etc.

Mr. Dreier said that frequent talks by officials of the company and by outsiders in sympathy with its work and problems are helpful. Letters of praise for good work should be published, and whenever such a letter is received it should be read to the employee concerned. More attention to publicity and less hiring of lawyers to get companies out of trouble are desirable. In conclusion Mr. Dreier urged companies to tell the public about the good work they are doing.

EX-GOVERNOR COBB ON PUBLIC RELATIONS

At the New England Street Railway Club meeting Feb. 22 former Governor William T. Cobb of Rockland, Me., who is at present affiliated with various public utility interests, spoke on "Public Relations." He said that public utility development could never have been started if the promoters of the early companies had not been convinced that more than 5 per cent interest would be the reward of their enterprise, energy and faith. "The present situation cannot go on," said the former Governor. "Men won't put their money into these enterprises unless guaranteed a fair and a safe return. But, in the end, I believe that the sound common sense of at least a New England community will see that these corporations get a fair and honest deal."

In closing, the former governor said that inasmuch as the money of the companies must come from the public, it is time to stand up and insist upon company rights. The public are the customers of the companies, not their patrons. It is time to let the public know that the companies are honest, decent and fair-minded. "Nine-tenths of our electric railway managers are afraid to go before the commissions and demand their just dues," said the speaker, who deprecated delegating these tasks to lawyers. "A better day is coming. The corporations are doing right to-day, and I believe that the public will do right, too, ultimately. The public is treating us unfairly, almost dishonestly to-day. We have got to get better rates, and then our troubles will largely be over."

American Association News

A. E. R. A. Joins Chamber of Commerce of United States—Transportation-Accounting Committee Meets in New York—President Storrs Appoints Committee on Accident Reduction—Application of Safety Code Urged by A. E. R. E. A.—Activity in the Company Sections

Association Joins National Chamber

As a result of the action of the executive committee of the American Electric Railway Association, that organization has become a member of the Chamber of Commerce of the United States. Gen. George H. Harries will represent the association as national councilor. In addition, the association is entitled to ten delegates at the annual meeting. At the meeting recently held in Washington J. H. Hanna, of Washington, sat in the National Council as a substitute for General Harries, who was unable to attend, and C. Loomis Allen was present as a delegate.

Transportation-Accounting

On Feb. 19 the transportation-accounting committee of the American Electric Railway Association held a meeting at headquarters in New York. Those in attendance were Chairman A. E. Dedrick, auditor Mahoning & Shenango Railway & Light Company, Youngstown, Ohio; G. E. Kalweit, auditor Milwaukee Electric Railway & Light Company, Milwaukee, Wis., and W. O. Ingle, auditor New York State Railways, Rochester, N. Y.

The meeting was held for the purposes of carrying on a general discussion and forming plans to collect data on the following subjects:

1. Determination of a formula to show the cost per annum for hauling 1 lb. or 1-ton car weight.

(To continue the following subjects assigned the 1916 committee):

2. (a) Investigation of cost of handling baggage free to determine whether the cost of handling this baggage wipes out the profit resulting from the fare received.

(b) Investigation of sub-division of power cost between maintenance, construction and operation.

3. Forms of graphic presentation of transportation data and statistics.

The committee will at once begin the collection of data along these lines.

Manila Section Awards Medals

At the meeting of joint company section No. 5 held in Manila on Jan. 9, 1917, the feature was the award of medals by the company to the writers of the best three papers presented before the section during the past year. The awards were made to the following: C. H. Van Hoven, claim agent, gold medal for his paper on "How the Claim Agent Earns His Salary"; E. I. Jefferey, assistant chief engineer power plant department, silver medal for his paper entitled "The Power Plant Employee and His Qualifications," and Eugene Wagon, traffic inspector transportation department, bronze medal for his paper on "Duties of Trainmen." The abstracts of these papers were printed respectively in the issues of the ELECTRIC RAILWAY JOURNAL for Aug. 5, 1916, page 235; June 24, 1916, page 1187, and Sept. 23, 1916, page 538. F. P. Santiago, the new presi-

dent, assumed office at this meeting and appointed committees for the year, after which a game of volley ball was played. As usual the transportation department orchestra furnished music during the evening.

Committee on Reduction of Accidents

President Storrs has appointed a committee of the American Association to report upon ways and means for securing a reduction in accidents at grade crossings with steam railroads. The committee will take up the entire question as regards education, protective appliances, apparatus and legislation.

The members are: B. I. Budd, chairman, Chicago; Henry G. Bradlee, Boston; R. B. Stearns, Milwaukee; A. M. Patten, Topeka; E. C. Faber, Aurora; T. W. Wilson, Wilmington, and E. W. Wakelee, Newark.

A. E. R. E. A. Urges Application of National Safety Code

The second edition of the National Electrical Code has been issued by the Bureau of Standards "for examination, trial and constructive criticism." The results of its tentative operation will be investigated by a special committee appointed by the Association and which will represent the Association in matters pertaining to revision of the code after a period of actual trial. Secretary E. B. Burritt has sent letters to member companies in an effort to emphasize the importance of a thorough trial application of the code and of suggestions for changes before its final form is recommended for adoption. Another letter has also been sent to members of various committees urging them to develop helpful criticism and suggestions.

Dean Frank H. Sommer Speaks at Newark

A convincing address on the topic "The Man on the Outside and the Man on the Inside—What is Needed to Bring Them Together?" was delivered at the meeting of the Public Service Railway Company section at Newark, N. J., on March 1, by Frank H. Sommer, dean of the New York University Law School. He outlined the fundamental principles involved in the administration of private property devoted to public use and pictured the conditions under which the public and the utilities must come together for adjustment of their points of view.

Before the address a splendid tribute was paid to the memory of the late J. J. Burleigh, until his death second vice-president of the Public Service Corporation, by J. L. O'Toole, of the publicity department. Mr. Burleigh had been one of the most active supporters of the company section and was in close touch with the personnel of the organization through the welfare work of which, among other things, he had charge.

Section President A. T. Warner stated that the membership is now 445. He explained a plan for securing constructive criticism of the proposed standard definitions which the T. & T. Association has in preparation.

The plan in brief is that copies are to be distributed to all interested members, comments are to be received by the secretary and turned over to a special committee, and finally the committee is to edit the comment and forward a report to Secretary E. B. Burritt. Mr. Warner commended the new scheme for securing the assistance of the company section membership in association committee work.

Section No. 4 Discusses Fare Increase

At the meeting of the Washington Railway & Electric Company section held on Feb. 19, Clarence P. King, president of the company, addressed the local members recommending a straight 5-cent fare. Mr. King said it is a very difficult problem to improve the service under the prevailing conditions of tremendously high prices of materials and labor and that he believed the public would not object to paying the straight fare if better service could be given.

Col. Robert N. Harper, chairman of the inaugural committee, also spoke at the meeting. He urged that courtesy on the part of the company employees be shown to inaugural visitors at the capital as this would go far toward creating a widespread favorable opinion of public utilities. Other speakers were representatives of the Federation of Citizens' Association, the Board of Trade and the Chamber of Commerce.

Toledo Section Has Large Membership

At the meeting of the joint company section recently formed by the Toledo Railway & Light Company, Toledo, Ohio, the announcement was made that the charter membership comprised 321 persons; 168 from the N. E. L. A.; 120 from the A. E. R. A.; twenty-three from the N. D. H. A. and ten from the A. G. I. At the meeting T. J. Nolan was elected president; D. E. Snider, vice-president; H. Friede, secretary, and A. T. Van Griesen, treasurer. Members of the executive committee were also elected and announcement was made of the action of the executive committee on Feb. 19 in appointing chairmen of the committees on finance; education and library; publicity and attendance; meetings, program and papers; group work; by-laws and constitution; entertainment, and membership and hall.

The meeting was largely of an entertainment character, the feature being a "stunt" entitled "A Bit of Southern Minstrelsy." Motion picture films furnished by the General Electric and Westinghouse Companies were also shown.

Professor Woodworth Lectures Before Section No. 6

At the regular meeting of the Chicago Elevated Railroads company section, held on Feb. 21, Prof. P. B. Woodworth, of the Lewis Institute, lectured on the subject of "Voltage Loss or Drop." He illustrated the lecture with experiments, using original apparatus. This is the second lecture delivered by this speaker during the current season and it is expected that he will lecture again in the near future.

By way of entertainment "The King of the Rails" film, secured from the General Electric Company, and a short film showing the return of the Seventh Infantry, N. G. Ill., from Fort Sheridan over the North Shore and Northwestern Elevated, the detraining at Randolph Street and Fifth Avenue Station and the parade through the loop was also shown. This meeting was notable in that more than 240 persons were present, the largest attendance since the organization of the section.

COMMUNICATIONS

Classification of Trucks

BROOKLYN RAPID TRANSIT SYSTEM

BROOKLYN, N. Y., Feb. 24, 1917.

To the Editors:

The suggestion recently made by S. A. Bullock in regard to classifying trucks is very simple, and it is comparative as far as the various classes of trucks are concerned. But it is not definite as to the exact style. For instance, the Brooklyn Rapid Transit Company uses Brill 39-E, 39-E-1 and 62-E trucks, which are all maximum-traction trucks with one outside-hung motor and a 54-in. wheelbase. All would come under the symbol 10-54-40 without any ways or means of identifying the style, and it would seem to me that, instead of the center-plate loads a letter defining the style should be used. For instance, 39-E might be 10-54-A; 39-E-1 might be 10-54-B, and 62-E might be 10-54-C. The center-plate load figures could be placed after the letter if deemed necessary. However, the information would not be required to define the type of truck, and this would greatly simplify the memorizing of the symbols.

W. G. GOVE,
Supt. of Equipment.

Rake of Trolley Poles

THE CONNECTICUT COMPANY

NEW HAVEN, CONN., Feb. 28, 1917.

To the Editors:

In the issue of the ELECTRIC RAILWAY JOURNAL for Feb. 17 there appeared a letter from J. G. Koppel on the subject of the rake of trolley poles. This letter was particularly interesting as showing what different aspects the same subject may offer to different observers. Mr. Koppel feels that the raked pole is inartistic, and questions if the treatment has any excuse. The majority of line engineers, and incidentally a great many municipal authorities, desire the poles raked not so much for the slight reduction in the horizontal component of the span pull or bracket load as for appearance's sake.

Obviously where trolley poles are sandwiched among other poles, if the first are raked and the others plumb, there is an unpleasant contrast in looking along the line. Under such circumstances the rake is better omitted. In fact, if the line also carries circuits on cross-arms the poles are necessarily set plumb to prevent interference. But where there is no such condition it will be found that, as a result of the sag of the span, a span pole set plumb appears to the average man as if it leaned into the street. The writer has heard of several instances where poles ordered set plumb by the authorities were later given a rake by request of the same authorities because of this optical illusion.

In the case of a bracket pole the projecting bracket has not as much effect as the sloping span, but here too a plumb pole appears as if leaning outward. With guyed poles the rake has another function. The pole is a strut, and as such should bisect the angle between the opposing forces, which act along the guy and the span. This compels that a backward lean be given to the pole.

As to the values of rake to be used, there is no particular warrant for any definite ones, but those given in the Engineering Manual, Ds 2b, Section 18, are practically the values in use the country over, expressed in a very simple relation.

In regard to the esthetics of the matter, it may be said that while the plumb line, square, and level are highly important in mechanical construction, Hogarth's "line of beauty" is not the product of any nor yet of all of these. The triangle still stands as the symbol of unchanging resistance and the arch is the type of graceful strength. It is not "deadly parallels" that are needed to make our streets artistic. The most beautiful highways are those bordered by trees, whose lines do everything but appear straight, either vertically or horizontally, and the beauty of the old cathedrals arises more from the curves than the corners. Neither span nor bracket construction is an element of civic beauty, but in the majority of cities one or the other is a necessity. If either construction is so arranged that not only do the poles resist the forces applied against them but by their position they have the appearance of so doing, their fitness for their purpose is best indicated. After all, this is true art.

CHARLES R. HARTE,
Construction Engineer.

Completed Timber Treatment Necessary

THE SOUTHWESTERN ELECTRICAL & GAS
ASSOCIATION

DALLAS, TEX., Feb. 24, 1917.

To the Editors:

In the editorial in the Feb. 3 issue of the *ELECTRIC RAILWAY JOURNAL*, on the subject of the proceedings of the American Wood-Preservers' Association, a statement is made which might be misleading to many untechnical users of wood or to those who are not fully conversant with the whole science of wood preservation.

The statement to which I refer is the one which says:

It appears that not even wood preservers have universally recognized the inability of any commercial process of preservative treatment to stop decay that has once obtained a foothold.

This statement is only correct when very partial treatment is given to the timber. As is well known the destruction of wood by so-called "decay" is really a chemical action caused by the presence, growth and multiplication of enzymes, nearly all of which are sensitive to fairly high temperature and vacuum and are especially sensitive to even the fumes of certain chemicals or coal-tar and mineral-oil derivatives.

Unless the entrance into the pores of the wood of the preservative is done by the plain absorption or tank method, if the timber is subject to steam heat or to a fairly full vacuum, the destruction of the enzymes will be absolute, and if the wood is then subjected to even a partial treatment the interior will be protected as long as the treatment-skin is intact. Of course there is always the contingency that this preservative skin may be ruptured intentionally or accidentally and, as stated by you, a passage opened to the interior by which the enzymes may obtain access to the untreated timber and commence their work of destruction. It is for this reason that the writer has always advocated a complete "treatment," viz.: an injection of the preservative entirely through every portion of the timber. He believes that anything less than this is a final waste of money and a possibility of the risk which always accompanies decayed timber, especially where such timber is not accessible for constant inspection.

The point at issue is that while the proper handling of the timber before and after treatment is somewhat of a factor in the final perfection of the treatment it is not by any means so important a factor as is the thorough

and complete injection of the preservative through every portion of the timber. Proper seasoning of the wood before treatment is not a prerequisite of perfect treatment, but in a great many kinds of wood it does lessen the cost of the actual treatment and, to a very small extent, tends to preserve the cellular structure of the timber by making unnecessary the high temperature and high vacuum generally used where green timber or unseasoned timber is being treated. The writer has yet to see a case in timber exposed to the elements where skin treatment or anything short of full permeation of the preservative has not been a failure, or at least only a partial success. What makes this view of the matter more vital is the fact that, properly applied, the full permeation of the timber by a sufficient amount of the preservative to protect from decay costs but very little more in proportion than does the skin or shallow treatment.

The writer, in conjunction with Fred Langbahn of Galveston, made the first experiments at Galveston on the full permeation of timber by all classes of preservatives and without injury to the strength of the timber or the fiber or cells. It was proved to him then that the life of billions of feet of timber had been sacrificed to a small saving in money and time. His conclusions in this respect were verified at the time by a United States official, and they have been more than proved since that time by the adoption of the proper principles of wood treatment by nearly every wood treating plant in this country and abroad.

The writer wishes again to urge as regards both ties and paving blocks the complete permeation of the whole mass of the timber by sufficient of the preservative to kill any destructive germs or plant which may be in the timber at the time and to allow for the gradual evaporation or leaching out of the preservative thereafter. He would add that it is not necessary to overload the outside of the timber with the preservative, if care be taken and ample time be given in the treating process. It is always advisable to leave a *small* surplus of the preservative at the end of the filling process, as this will be distributed through the timber to a greater or lesser extent by capillary process thereafter. Also, as evaporation or leaching out of the preservative will occur first on the outside of the timber, a little excess left on the outside will permit such evaporation or leaching out without reducing the amount of the preservative below the danger point.

The writer at various times has seen a great deal of timber filled to saturation, or beyond, for a short distance on the outside while the interior had none whatever, and while such timber has been sold and guaranteed as containing such a per cent or such a quantity of preservative per cubic foot, and while this guarantee was true to the letter it was not true as regards the intent of such treatment which is, in all cases, so to fill all the pores and cells of the timber with preservative and without injury to the strength of the timber as to kill all inclosed enzymes and prevent their re-entrance for as long a time as possible in the future.

H. S. COOPER, Secretary.

The Buenos Aires Great Northern Railway is electrifying its suburban lines on a plan similar to that of the Central Argentine Railway. It will use a third-rail at 800 volts and energy will be supplied from the power station of the Buenos Aires Western Railway. The progress in electrification of the suburban sections of each of the above-named roads promises electric service for the suburbs of Buenos Aires in the near future comparable with those to be found in the other large cities of Argentina.

Practical and Economical Solutions of Problems in EQUIPMENT AND ITS MAINTENANCE

Getting the Scale Out of Surface Condensers
—Syracuse Front-Entrance, Center-Exit Car—
New Way of Welding Trolley Poles—Other
Shop and Line Stories and New Apparatus

(Contributions from the Men in the Field Are Solicited and Will Be Paid for at Special Rates.)

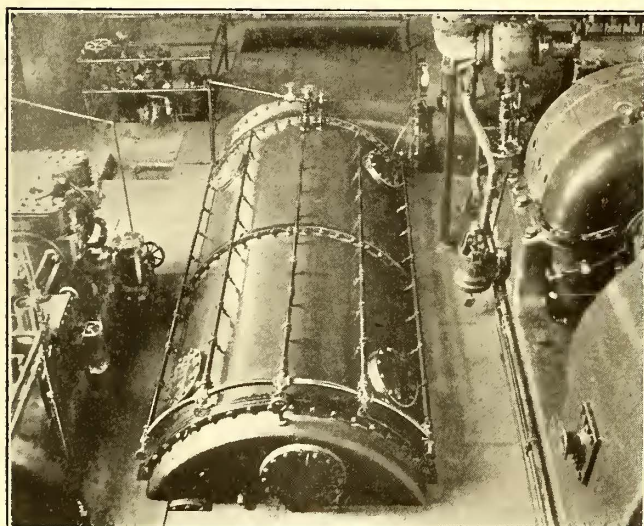
Surface Condenser Cleaned with Kerosene

Effective Means Provided for Periodic Spraying to
Remove Scale and Other Deposits

BY F. C. CHAMBERS

Mechanical and Electrical Engineer, Des Moines City
Railway, Des Moines, Iowa

A 1100-sq. ft. Worthington surface condenser is installed in the power station of the Des Moines City Railway for use with a 2000-kw. mixed pressure turbine which operates on the exhaust from two 1000-kw. reciprocating units. Naturally the oil content in the exhaust steam is high and this was formerly the cause of considerable difficulty. The turbine would carry only about 1000 kw., and it was finally taken down to find



PIPING ARRANGEMENT ON SURFACE CONDENSER FOR SPRAYING
KEROSENE FOR CLEANING

that some 20 per cent of the blades were entirely closed off with deposit. This and the poor vacuum caused by deposit and scale in the condenser were, of course, responsible for the poor operating characteristics. After cleaning up the machines the turbine would carry 2000 kw. and considerable overloads without trouble, and the plant coal consumption was cut down very appreciably.

In order to make these conditions permanent and prevent recurrence of the deposit accumulation, a scheme was devised for cleaning turbine and condenser which has been very effective.

A 2-in. pipe was installed to connect the circulating pump with a 2-in. header at one end of the condenser. From this header five pipes, each varying in size from 2 in. in diameter at the header to $\frac{3}{4}$ in. in diameter at the far end, were connected up across the section of the condenser above the turbine room floor, as seen in the

illustration. Each of these was tapped into the condenser through nine small bore pipes. Then once about every three months, with the machine shut down, the hot well is pumped dry and a barrel of kerosene oil dumped into the handhole in the condenser. The discharge pipe on the hot well pump leading to the heaters is closed off and the valve in the pipe leading up to the header over the condenser opened. The hot well pump is then used to force this kerosene from the hot well under pressure around through the spray nozzles. It is circulated for from two to three hours and then drained and allowed to settle. The light oil coming to the top is poured off and used to put through the turbine.

The kerosene treatment is given to the turbine in 50-gal. quantities once a week through a $\frac{3}{4}$ -in. pipe with numerous needle point holes in it, which is inserted across the steam intake pipe. This kerosene is also carried to the condenser with the steam and helps to keep it free of deposit. This, with the thorough cleaning of the condenser every three months, has kept turbine and condenser in good condition. A test of the condenser condition is made frequently by means of the vacuum gage which is piped up so that it may be made to read the pressure at the intake and outlet sides separately, and the difference gives a good indication of the condition of the condensing surfaces.

Hot-Water Heaters for Electric Cars

Suggestions Given After Several Years' Experience
with This Type of Heater Installed on
More Than a Hundred Cars

BY F. J. FOOTE

Master Mechanic, Ohio Electric Railway, Columbus, Ohio

The writer hopes that a brief description of some experiences in the installation, maintenance and operation of hot-water heaters may be useful to others interested, and that it may provoke some discussion on the subject.

INSTALLATION

In regard to installation, it has been our experience that careful attention to every detail is well repaid in more satisfactory operation of the plant. The most important requirement in the operation of any hot-water heating system is rapid circulation of the water. Anything that offers undue obstruction to the flow in the pipes, therefore, should be avoided.

It is incorrectly believed by some that the steam pressure generated by a hot-water heater, assists in the circulation of the water. This is not the case, however, for the pressure in the expansion chamber acts equally on both the hot-water and the cold-water columns. The force that causes circulation is due to the difference between the density of the water in the heater and adjacent pipes, and in the remainder of the heating pipes

throughout the car. The cooler water in the latter portion of the circuit, being heavier than the hot water at the heater, forces it to rise and thus produces circulation. It follows that a hot fire causes more rapid circulation of the water, due to the resulting greater difference in density of the water columns.

Until the water reaches the boiling point, this difference in density is caused by the difference in temperature only. Above the boiling point it is due largely to the presence of small globules of steam, formed in the water as it passes through the heater coil. The mixture of steam and water, being much lighter than water itself, creates a much more rapid circulation than is possible below the boiling point. Since the rise of pressure, as shown by the gage, is simultaneous with this action, it was thought that steam pressure is necessary to good circulation.

HOT-WATER CAR HEATER, SHOWING PIPE CONNECTIONS AND AUXILIARIES

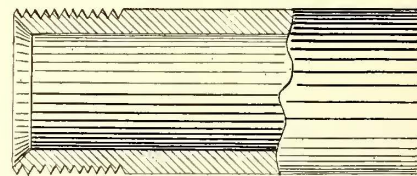
Since the force that causes the water to circulate is very feeble, especially below the boiling point, it is highly important that the circuit be as free as possible from short bends, and that the pipe have a smooth inner surface. If the pipes are cut with an ordinary pipe cutter the ends are likely to be rough and partly closed. The ends, therefore, should be reamed out to remove rough edges or burrs.

The height of the heater above the floor of the car is not important, but the expansion tank should be placed as high as possible, although it is not necessary to place it on the roof. A safety valve should be located above the roof and connected by a straight pipe to the expansion tank. A small pet-cock should be tapped into the top of the tank to permit the outlet of air when required, and a gage glass, filling cock and reliable pressure gage should also be provided. The cross-over pipes under the car floor, which connect the two main sections of the heating pipes at the sides of the car, should be covered with a good pipe covering and provided with large-size cocks for use in draining and washing.

The most important consideration in the maintenance of hot-water heaters is keeping the pipes clean. This can be done by connecting one of the drain cocks under

the car floor to a hydrant, opening both drain cocks and forcing water through the pipes at a high velocity. This has a tendency to dislodge any dirt or scale that may have accumulated in the pipes. It is advisable to force the water through the pipes in both directions. At one of our carhouses, where the low water pressure is ineffective, the use of an old air-brake reservoir and compressed air from the shop air system was employed for cleaning, with excellent results. An accompanying illustration shows the connections to the reservoir. To operate, the cocks leading to the heater pipes and compressed-air supply are closed, and the others are opened to admit water to the reservoir and let the air out. When the reservoir is full of water, the latter two cocks are closed and the others opened, permitting the air pressure to force the water through the heater pipes. This operation is repeated if desirable.

The pipes should be washed at least each year before putting the heaters in service, and if muddy make-up water must be used washing should be done more frequently. Too much stress cannot be placed on the necessity of putting the water through the pipes at a high velocity. We have just had a case that confirms this. A certain car that had heated well for years began to be known as a "poor heater." With a good fire in the stove and the steam gage indicating pressure, some of the pipes were cold. After washing the pipes several



END OF PIPE REAMED OUT TO REDUCE FRICTION

times in the ordinary way with no marked improvement the heater was disconnected and part of the pipes removed. The cross-over pipes were disconnected, and each section and the heater itself were connected separately to a water hydrant with 1½-in. fire hose. A considerable quantity of very dirty water came out of the pipes, but the heater was practically clean. After this thorough washing, the car heated as well as ever.

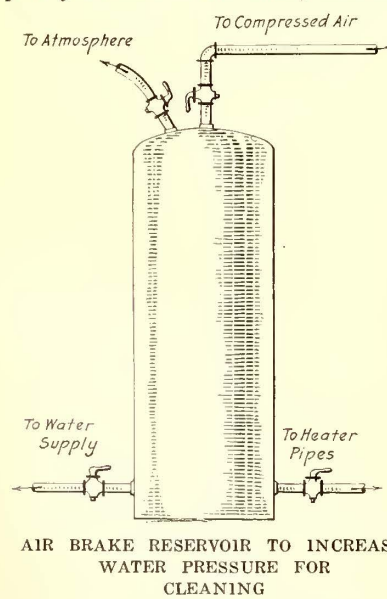
The safety valve should be cleaned and tested at least once or twice each year. New springs should be put in about every two years, as the old springs are weakened by rust so that, when compressed to give the required test pressure, they will not allow sufficient lift of the valve to relieve the pressure rapidly.

The grates in the heater should be kept in first-class condition so that a good fire can be maintained with the least amount of labor and fuel.

OPERATION

Proper operation requires a good fire and plenty of water in the heater. Putting water into the system is a very simple matter when the heater is cold, but with steam pressure the pipes must be connected to a hydrant, or a force pump must be used. We have found a small hand force pump, such as is used for spraying shrubbery, with a quick-action coupling, to be very convenient. This can be connected to a drain cock under the car floor or by a special connection put on the expansion tank.

Trouble is sometimes experienced in filling the pipes on account of air pockets. Frequently, after filling the system apparently completely, as soon as a fire is started or the car moved, the water in the gage glass will disappear. This is due to the entrained air working out of the pipes. A good method for filling an empty sys-



tem is to fill it completely and then add water as the fire becomes hotter until the level in the glass is constant and a good circulation is established. A very hot fire just after filling helps much to drive the entrained air out of the pipes.

The fire maintained depends largely upon the operator. One man will keep a good fire, while another will take the same car and let the fire go out in a short time. A good quality of hard coal, of proper size, should give no difficulty, although crushed coke requires attention to drafts to maintain a uniform fire. Hard coal of very small size is better when mixed with about an equal amount of crushed coke. The secret in handling hard-coal fires is the frequent addition of a small amount of coal. The later types of hot water heaters are provided with magazines. We have found that most of these magazines are too short to give satisfactory results and have lengthened them so that they give the proper depth of fire over the grate.

Special Machine Used to Repair Trolley Poles

Joint Reinforced with Steel Tube Before Being
Welded Gives Good Results at Low Cost

BY G. J. SMITH

Superintendent Rolling Stock and Shops,
Kansas City (Mo.) Railways

At the shops of the Kansas City (Mo.) Railways considerable saving has been effected by the use of oxy-acetylene cutting and welding, especially the latter. The recent status of prices and deliveries on various metal articles has been a great incentive for wider use of this method of repairing; in fact, we wonder how we ever got along without it.

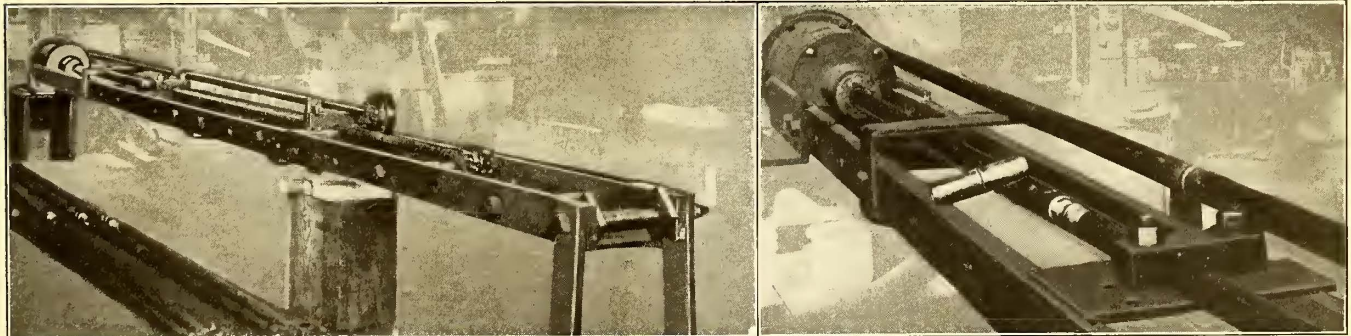
A notable example of the saving effected is in the welding of trolley poles. Our standard is a 14-ft. cold-drawn, reinforced, seamless pole, which costs us \$3.20

bulldozer and the ends cut off square. Each piece is then placed in a special lathe, with the tailstock far enough from the headstock to allow for a slight movement of the end. The pole is clamped to prevent it from turning. A reamer placed in the headstock is run into the end of the pole, reaming it out to about 1 7/16 in. diameter for a length of 3 in. At the end of the travel of the reamer a special cutter trues up the end and cuts the outside edge off on a bevel, as is required for welding. The pole is then ready for the application of an interior reinforcing tube, for which a piece of seamless steel tubing with 1 1/2-in. outside diameter and a 3/16-in. wall is used on account of its strength, ease of machining and smoothness of surface after turning. It is cut into pieces 6 in. long, which are placed in a lathe equipped with a cone in both headstock and tailstock. These cones, of course, automatically center the tubing and no chuck or clamp is required. The tube is turned to a drive fit in the pole, with the exception of a collar about 1/8-in. wide in the center, which is left full diameter to insure the centering of the tube between the pole sections.

The sections are then placed in a special press, designed for the purpose and consisting of a double-bar frame with a tail block at one end and a 10-in. brake cylinder at the other. The reinforcement is started into place and the press forces the parts together. The joint is then made permanent by welding with the oxy-acetylene outfit. The total cost of this work, using dissolved acetylene, averages 92 cents per pole.

The method as outlined above is, of course, used only on the large or main portion of the pole where by far the greater number of breaks occur. When the break is in the smaller portion a simpler reinforcement of iron pipe or a rod is used.

After welding the poles are equipped with new harps and wheels when required, and painted, and (as articles of this sort always "wind up") "they are as good as new." In the accompanying illustration is seen a pole



PRESS FOR FORCING REINFORCING TUBE INTO SECTIONS OF BROKEN TROLLEY POLE, AND ENLARGED VIEW SHOWING ONE OF THE REINFORCING TUBES

under normal conditions. A recent request for quotations brought a delivery promise of ninety-four to ninety-six weeks, and as a result a method of welding broken poles was worked out which is taking care of our requirements very well. Our previous method, which was not entirely satisfactory, was simply to cut off the ends of the poles and weld them together in the ordinary manner; but they frequently broke at the weld. This was no doubt due in part to the fact that the pole struck the overhead equipment at approximately the same point on the pole as it had on the previous break, thus putting the strain in the same place. Our present process of welding poles is as follows:

When a number of broken poles has accumulated they are sorted out and pieces matched to give the correct length. These are straightened in a special die on the

in place in the press with the sections pressed about half-way together. A finished pole, showing clearly the appearance of the completed weld, is lying on top of the press, and a turned section of tubing, ready for insertion, is also lying on the press near the joint in the pole.

A new insulating material known as "galalith" has been produced in Germany, according to the U. S. Commercial report No. 238. This material is a bone-like substance manufactured from casein and formaldehyde. Galalith, which has a yellowish-white horn-like color, is said to be an excellent insulating material. It is workable either in the hot or cold state, the cold galalith being softened by treatment in hot water. It is odorless and much less inflammable than celluloid, but cannot be made into very thin sheets.

Front-Entrance, Center-Exit Cars for Syracuse

Twenty-five Cars of This Type Have Been Placed in Service on Two Important Lines and Have Given Very Satisfactory Results

Recently the New York State Railways has placed twenty-five Peter Witt front-entrance, center-exit cars in service in the city of Syracuse. Eighteen of the cars are in operation on a line that runs from the extreme northern section of the city on practically a level route, through the business district, to the extreme southern section. The average speed maintained on this line is 9.72 m.p.h., with an average number of stops per trip of forty-two in a run of 5.17 miles. Six of the remaining cars are in operation on a line that runs from a residential district, located on elevated ground, through the business section to another residential section, which also is on elevated land at the other side of the city. The grades range from 5 per cent to 9.12 per cent, and the average speed is 8.19 m.p.h., with an average number of stops per trip of thirty-three in a run 4.68 miles long.

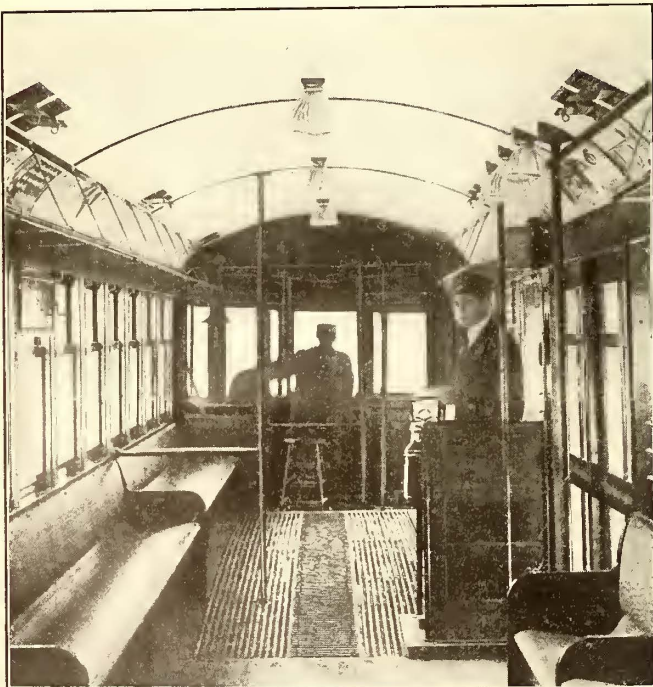
The heaviest traffic point on each line is at its center, which is the business district of the city, and the greater portion of each line is double-tracked, wyes or loops being provided at either end. Of the twenty-five cars purchased to serve the two lines, one is normally held in the carhouse for emergency use.

The new cars consume approximately 30 per cent less power than those originally in use. With the new cars, too, the rate of acceleration has been increased to 2 m.p.h.p.s., which increases the time of free running. The equipment of each of the new cars consists of four 25-hp. Westinghouse Wee motors, with single-end control; whereas the equipment of the old cars consists of

to be that conflict of outgoing and incoming streams of passengers is impossible and that, because of the arrangement of the doors, the time consumed in fare collection is greatly reduced. Passengers enter by way of the front doors, which are double, passing into the car in a double stream, thus reducing by one-half the time that ordinarily would be taken in loading a single-



NEW SYRACUSE CAR LOADING AT TRANSFER POINT



INTERIOR VIEW OF FRONT-ENTRANCE CENTER-EXIT CAR FOR SYRACUSE

four 40-hp. motors. The new cars allow 18 in. per passenger and seat forty-eight, against forty-four for the other cars, giving a weight per seated passenger for the new cars of 600 lb., against 900 lb. for the others.

The advantages of the new body design are reported

entrance car, even if the conductor were not obliged to hold up the line to take fares. Besides the advantage of the double-entrance door, the location of the conductor at the center of the car effects another very material saving in time. Passengers pass half the length of the car before it is necessary for their progress to be checked by the collection of fares, and instead of the front platform alone serving as a space for boarding passengers who are waiting to pay their fares, the entire front half of the car serves this purpose.

The entrance is protected by two folding doors. The center-exit doors are of the sliding type and are operated separately by means of a manual-pneumatic door engine built by the National Pneumatic Company, the levers for the control being located in front of the conductor's position. At the exit doors the steps are placed inside the car, thus doing away with the necessity of folding steps, and stanchions conveniently located serve as grab-handles, making the exit safe and easy.

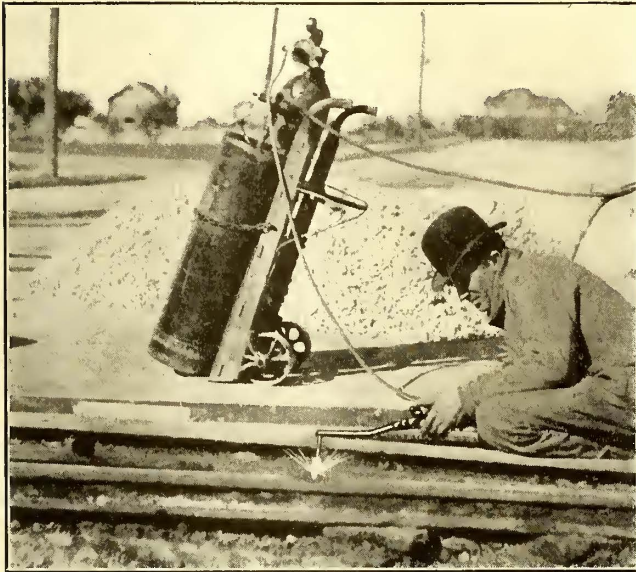
The cars are built on all-steel underframes with a plate-steel girder. Angle side sills are used, bent down at the center on the step side for the low center-exit door and dropped at the front end for the entrance doors and the vestibule. The crossings are of channel, and the bolsters are of the built-up type with top and bottom plate spaced by spindles. U-shaped intermediate longitudinal members are used. The side posts are of the T-bar type.

The windows have stationary top sashes and bottom sashes arranged to raise. The roof is of the Brill arch type, with ventilators down each side and lights down the center of the car. At the motorman's end there is a Peter Smith heater, directly opposite the entrance doors. The windows are protected on the door side of the car with a five-bar guard, and on the closed side

with a screen. The lighting system is laid out for five 94-watt units with one extra unit held in reserve, which can be cut into the circuit in case of failure, with a Nichols-Intern selector switch.

Cutting Up Old Rail for Steel Ties

The San Antonio (Tex.) Traction Company is finding a more profitable use for its old steel rails than selling them for junk by cutting them into lengths suitable for use as steel ties underneath track construction. This is being done economically and rapidly by the use



GAS-CUTTING OUTFIT MOUNTED FOR WORK IN THE STORAGE YARD

of acetylene gas supplied from a Prest-O-Lite outfit mounted on a hand truck. The old 60-lb. rails are temporarily bolted to improvised ties, cut off in the proper lengths and the necessary holes are quickly cut through. The time required to cut off a piece of 60-lb. rail is about thirty seconds, and the operator is making between 800 and 900 cuts in a nine-hour day.

Boiler Feed Water Softening Simplified

Calculation of the Proper Amounts of Treating Material Shortened by Use of Table

The instructions given in a recent A. S. M. E. paper by Arthur C. Scott and J. R. Bailey on the treatment of boiler feed water can be used readily by power station engineers. Suppose that the water analysis is as given by Table I:

TABLE I—SAMPLE WATER ANALYSIS

	Grams per liter
Sodium chloride	0.0744
Sodium sulphate	0.1110
Magnesium sulphate	0.3525
Calcium sulphate	0.4422
Calcium bicarbonate	0.2535
or	
Calcium carbonate	0.1565

TABLE II—FACTORS FOR CALCULATING WATER-SOFTENING CHEMICALS

Salt	Soda-Ash Factor, Na_2CO_3	Factor, Lump Lime, (CaO)	Factor, Hydrated Lime, $Ca(OH)_2$
Sodium carbonate (Na_2CO_3).....	.....	0.529	0.699
Magnesium chloride ($MgCl_2$).....	1.113	0.589	0.778
Magnesium sulphate ($MgSO_4$).....	0.881	0.466	0.616
Magnesium bicarbonate ($Mg(HCO_3)_2$).....	.....	0.767	1.014
Magnesium carbonate ($MgCO_3$).....	.....	1.330	1.757
Calcium bicarbonate ($Ca(HCO_3)_2$).....	.....	0.346	0.457
Calcium carbonate ($CaCO_3$).....	.....	0.560	0.740
Calcium sulphate ($CaSO_4$).....	0.779	.....	.....
Calcium chloride ($CaCl_2$).....	0.955	.....	.....

TABLE III—GRAMS REQUIRED PER LITER OF HARD WATER

	Soda Ash	Lump Lime	Hydrated Lime
Sodium chloride	None	None	None
Sodium sulphate	None	None	None
Magnesium sulphate	0.3106	0.1643	0.2171
Calcium sulphate	0.3445	None	None
Calcium bicarbonate or			
Calcium carbonate	None	0.0877	0.1158
Total	0.6551	0.2520	0.3329

The grams per liter given by the analysis are multiplied by the corresponding multiplication factors given in Table II.

This gives the amount of softening chemicals required as shown in Table III. Either lump (unslacked) lime or hydrated lime can be used.

In either the slacked or unslacked form, however, lime has only about 70 per cent efficiency due to impurities and minor combinations, therefore slightly over 40 per cent more than calculated is necessary. Soda ash is about 90 per cent efficient, so about 11 per cent more than calculated is needed. In order to avoid the cost of tankage, which the use of clear lime water would entail, it is customary to use milk of lime. To express the results given in Table III in pounds per 1000 gal. of water it is only necessary to multiply by 8.347.

It was pointed out in the paper that the amount of scale-forming material may serve as a basis for classifying boiler waters. For instance, less than 8 grains per gallon represents very good water, 8 to 15 grains good, 15 to 20 fair, 20 to 30 poor, 30 to 40 bad, and over 40 very bad. Scale due to temporary hardness in water will deposit as a loose sludge that can be readily blown off. When the ratio of magnesium and calcium bicarbonate to other salts of these two elements is less than 4 to 1 the scale will be hard and very adhesive.

Home-Made Sanding Device Found Economical

Compressed Air Used to Operate Sander and to Clear the Pipes of Sand

On the interurban cars of the Pacific Northwest Traction Company, of which E. M. Swift is master mechanic, considerable difficulty has been experienced in getting car sand to run freely under all conditions. About two years ago a scheme was tried which has operated satisfactorily even in severely cold weather. It is very economical in the use of sand, and maintenance charges have been practically eliminated.

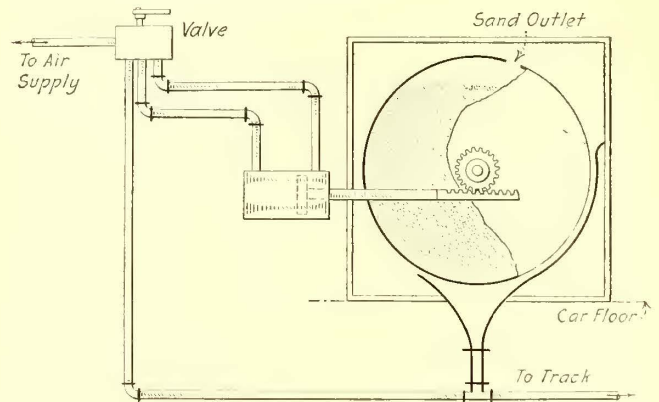


DIAGRAM SHOWING PRINCIPLE OF TRACK SANDER

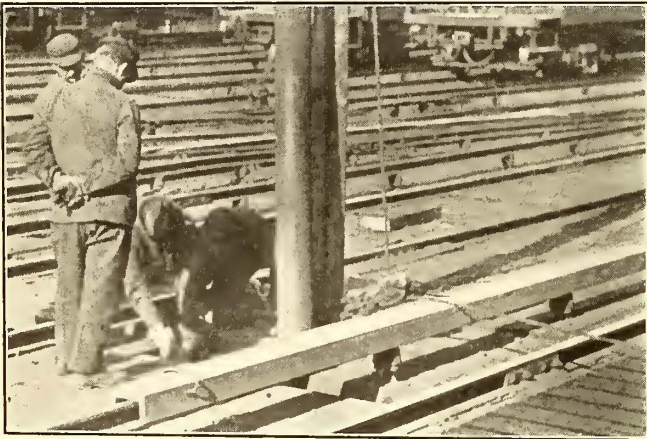
The sand is contained in a cylindrical drum mounted on its axis in a box in the motorman's cab. The drum is rotated by a rack and pinion, actuated by a small air cylinder which has two ports connected to a three-position valve. Sand runs through a 1/2-in. round hole in the drum, so placed that it is normally at the top, as

shown in the illustration. When air is admitted to the cylinder, the movement of the rack rotates the drum to a position so that sand can drop through the small hole into the outlet pipe which leads to the track. The sand is blown through this outlet pipe by air which is admitted with the valve in the next position. Upon closing the valve, air is first admitted to the cylinder through the reverse port, to rotate the drum back to its normal position, while air continues to flow through the outlet pipe. The motorman closes the valve when all the sand in the pipe has been blown out. The rotation of the drum agitates the sand, and if it is damp, permits the dry portion, which is normally at the upper surface, to run out first.

It is intended to procure patents on this sander and place it on the market in the near future.

Temporary Protection for Third-Rail

The accompanying illustrations show two types of third-rail protection used on the lines of the Brooklyn Rapid Transit Company to prevent workmen from coming in contact with the live rail. One consists of an inverted wooden trough dropped over the top of the rail. When trains are operating over the tracks the protection



THIRD-RAIL TEMPORARILY PROTECTED BY WOODEN TROUGH

can be quickly removed by lifting it off with the rope handles. Another and more permanent protection consists of a 2-in. board erected between the third-rail and the running rail. This need not be removed to allow trains to pass, and it is often used at switch movements,

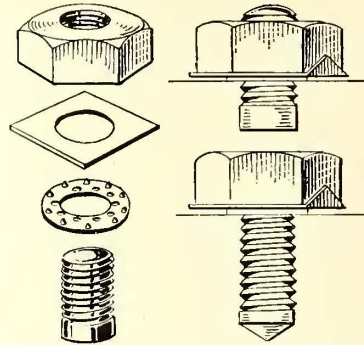


THIRD-RAIL PROTECTED BY BOARD AT THE SIDE

signals, and walks where employees have to work close to the contact rail. While the board does not cover the top of the rail, it is high enough so that most tools will bridge from the board to the ground without making contact with the rail.

Lock Nut with Soft Metal Washer

The lock nut illustrated has lately been placed upon the market by F. R. Blair & Company, Inc., of New York. It is known as the "Loxon" lock nut and consists of three parts, a seating ring with sharp points on both sides, a square washer of soft metal, and a hexagonal



ASSEMBLY AND PARTS OF LOCK NUT

nut, applied to the bolt in the order mentioned. When the nut or cap screw is tightened as far as it will go a corner of the square washer is bent up, firmly locking the nut. The points of the seating ring grip the soft metal washer on one side and the casting on the other when the nut is screwed down.

Outdoor Switch-Houses for Connecting Small Power Customers to Line

Many railways are increasing their incomes by selling electric power to small towns, manufacturing plants or mines located along the line of their tracks or adjacent to their transmission lines. The load is often not large enough to warrant the expense of a substation with indoor apparatus, and to meet this situation, portable switch houses have been built by the large electrical manufacturing companies, the one shown in the accompanying illustration being the product of the Westinghouse Electric & Manufacturing Company.

These switch houses are built in two forms, one for pole mounting and the other for ground mounting. They are constructed of steel throughout and are provided with a large door that gives easy access to the interior and that can be locked, thus protecting the apparatus from tampering by unauthorized persons. These houses are usually designed to contain an oil circuit-breaker, a watt-hour meter with current transformers, and voltage transformers, besides calibrating and testing terminals and the usual wiring. The switch houses are not expensive, and they are portable and can be readily conveyed to localities where needed. The standard sizes are made in capacities up to 600 amp. at 7500 volts, and all apparatus is fully protected from the weather.



INSIDE VIEW OF PORTABLE SWITCH-HOUSE

London Letter

Difficulty of Maintaining London Traffic—Birmingham Considering Underground Line—How the Recent Increase in Fares Has Worked

(From Our Regular Correspondent.)

The maintenance of London's traffic facilities is proving a difficult problem for the authorities in view of other pressing claims on the ever-shortening supply of available labor. The curtailment of the train services has thrown a further burden on the trams, and on many of the routes the strain is beginning to tell, especially during the rush hours. It is understood that every effort is being made to maintain the service at the highest possible level of efficiency, although the provision of drivers and the delay in the repair shops have reduced the number of cars that are available. Mr. Hume, chairman of the highways committee of the London County Council, has stated that the policy throughout has been to keep as many cars running as possible. Where a car was not run it was because there was no driver to take it out. The management had been treated considerably by the recruiting authorities, but had been required to part with more drivers recently and found it impossible to replace them. There was no foundation for the statement that trail cars had been taken off. It was possible, however, that cars had been taken off some routes and put on others that were more congested. The fact had to be taken into consideration that the routes to munition works received preference over others.

At a recent meeting of the tramways committee of the City Council of Birmingham the question of better tramway terminal facilities for the center of the city was under consideration. This subject was hinted at by the Lord Mayor on the previous day, when, at a gathering of the Rotary Club, he referred to the difficulty of the full development of the tramway system, owing to the lack of space in the center of the city for effecting an exchange between the various routes. He suggested the construction of subways along which cars of the tramway system could run for a certain distance. The committee discussed the matter of better terminal facilities from the point of view of surface and underground methods, and A. Baker, the general manager, was instructed to prepare a definite scheme for subways in the center of the city. When this scheme is ready it will be fully considered by the committee, and if it is approved by the members and by the City Council it will, doubtless, be one of the first progressive measures undertaken after the war.

Mr. Baker is fully qualified by experience to prepare the report. When he was engaged under the London County Council, before he went to Birmingham, Mr. Baker visited America to investigate the subway methods in certain of the principal cities of the United States. On his return he presented a report upon which the subway was constructed that extends from the Thames Embankment to Theobald's Road, passing under Aldwych and Kingsway. The question of assisting the city rates by a contribution from the profits was also considered. Figures were submitted, and on these the committee could not contemplate making any contribution owing to the loss of £50,000, sustained through the electric supply department failing to supply current sufficient for continuous running. The loss thus caused represented the amount which otherwise would probably have gone toward the relief of the rates.

The drastic changes in fares and services of the railways, which were ushered in with the new year, have, upon the whole, been received philosophically. The Underground Railways, exceptionally, has not raised its fares. This would indicate that the directors and management are satisfied with the present rate of increase in the receipts. The tubes are doing well, and the receipts on the omnibuses are expected to increase considerably, as a result of the new regulations introducing an increase of 50 per cent in the railway fares. It is understood that the daily receipts per bus have already risen to £6 10s., as compared with about £4 10s., prior to the war. A more extended reference to this increase in fares was contained in the *ELECTRIC RAILWAY JOURNAL* of Feb. 3, page 221.

The Corporation of Edinburgh has adopted a recommendation by its tramways committee to the effect that it

should accept certain proposals submitted by the Edinburgh & District Tramways for the transfer of the undertaking to the city, and has remitted the matter back to the committee for adjustment and report. Thus, after a long period of consideration and discussion, the corporation has decided to purchase the whole system, and after the war is over extensive alterations and improvements will be inaugurated. At present a difficulty is that the terms on which the lease of the lines to the tramways company terminates, namely, June 30, 1919, were not laid down with sufficient clearness. The whole of the permanent part of the system—power stations, engines, and rails—belongs to the corporation, and cost altogether about £1,500,000, but the rolling stock is the property of the company. The lease does not suggest that the corporation should purchase the rolling stock, while the reports which have been submitted by experts recommend that the corporation should install in the city an overhead electric system at a fresh cost of about £600,000. The conversion of the system has, however, been prohibited by the government for the present. The proposals of the tramways company, now accepted by the Corporation, are that the city shall acquire the plant, including 200 cable-drawn cars, four electric cars, and fourteen single spare cable trucks, at a price of £50,000. All this plant will be useless if the reports of the experts are adopted and the cable system abolished, and thus £50,000 worth of plant will be rendered obsolete.

Owing to the congestion of traffic on the Glasgow tramway system at certain hours, the tramway committee of the Corporation has instructed the general manager to communicate with large employers of labor in the city to ascertain if some arrangement could be reached with regard to adjusting the meal hours and stopping time at public works, so that all the employees would not be released at the same hour. The committee has also decided to appeal to ladies who may be shopping in the city in the afternoon to make the homeward journey not later than 4 o'clock.

In view of the urgency of providing for additional supplies of power it has been decided by the Glasgow Corporation to proceed at once with the erection of the buildings in connection with the new power house at Dalmar-nock. The City Council has obtained authority to raise another £500,000 for the projected extensions.

The City Council of Hull has agreed to the recommendations of the tramway committee to abolish the ½d. stages on the principal routes, and to substitute a 1d. flat rate, with a ½d. flat rate for non-commissioned officers and men of the Army and Navy, who, at present, on weekdays have free use of the cars.

At a special meeting of the Liverpool tramways and electric lighting committee to consider questions of account and matters affecting fares and stages, it was decided to vote £125,000 from the tramways receipts toward the relief of the rates, and £65,000 from the electrical undertaking for the same purpose. This constitutes a record and represents nearly a 1s. rate. Last year the tramways contributed £100,000 to the reduction of the rates. There is reason to believe that action will be taken shortly with regard to the suggested shortening of the tramway stages.

The electors of Ashton at a public meeting have authorized the corporation to proceed with a Parliamentary bill, which will give the Town Council power to purchase the undertaking of the Oldham, Ashton & Hyde Electric Tramway within the borough and in the adjoining villages of Waterloo and Bardsley. Power is also sought to construct connecting tramways at a cost of nearly £5,000, and to run a motor omnibus service.

Electrification has re-established the East London Railway as a popular means of communication between the north and south of the Thames, east of the city. Conclusive evidence that this is so is furnished by an increase of nearly 9 per cent in the number of passengers carried in 1916. The goods traffic, which is still worked by steam, was also heavy. As the East London's share in the general railway pool is allocated on the basis of its proportion to the whole prior to the war, it gets no appreciable benefit from the expansion of its traffic and from the expenditure on electrification. The government is being asked by the directors to make a special case of the East London by allowing a sum to recoup the company for any liabilities in connection with the electrification.

A. C. S.

News of Electric Railways

Traffic and Transportation

Financial and Corporate

Personal Mention

Construction News

\$400,000 Improvement in Detroit

Detroit United Railway to Have New Track Storage Yard

The Detroit (Mich.) United Railway is making plans for a new storage yard for track materials to occupy a 21-acre tract of land on the Rouge River and West Fort Street. The present 9-acre yard at Harper and Mount Elliott Avenues will be turned over to the transportation department for use as an operating station for the new Grand Belt line which at present has no car station nearer than 2 miles from the line, resulting in a large dead mileage. The plans for buildings and equipment in the new storage yard have not been completed, but these will include the erection of an office building for the track department clerical force and superintendent, a car repair shop, machine shop, foundry, carpenter shop and stock room, sand drier, a stone crusher with 1600 tons a day capacity and other equipment. It is estimated that it will require more than \$400,000 to carry the plans to completion.

The work of erecting the new stone crusher at the Rouge yards is now under way and some temporary buildings are being built so that the Harper yard may be partially vacated as soon as possible. A large part of the material to be used in track work this spring and summer is now being stored at the new yard and use of the Harper yard will be discontinued as rapidly as possible. The complete plans for the Rouge yard, however, may not be consummated for about two years.

The new location will give several advantages in the handling and storing of way materials, in addition to the increased space and new equipment, which are not now available at the present yard. Direct connection with the Michigan Central, Wabash and the Detroit, Monroe & Toledo Short Line railways will be had, and the company also plans to construct a receiving dock 1100 ft. long on the Rouge River. When completed this will possibly be the largest electric railway storage yard in the country.

Minneapolis Negotiations Progressing

The street railway franchise negotiations in Minneapolis are progressing, although at such an early stage in the matter the general public is naturally somewhat apathetic. The company has made proposals for a distribution of requested street railway extensions averaging 17 miles a year for three years, and 9 miles for the fourth year, making a total of 60 miles, on condition that a settlement is reached in the pending franchise negotiations. This building program has been offered as a broad and comprehensive development for the future transportation needs of Minneapolis, and the distribution has been made with regard to the expected needs of various parts of the city.

The City Council at its last meeting ordered the company to build about 7 miles of double track, and has now turned its attention to an active consideration of the franchise itself.

The city attorney has begun work drafting a franchise and is working in connection with the central franchise committee, which is composed of representatives from various civic organizations.

The officers of the company stand ready and willing to make a deal as favorable as possible to the city, which will at the same time protect the integrity of the outstanding securities of the company.

A digest of the proposal of the company to the city was published in the *ELECTRIC RAILWAY JOURNAL* of Dec. 16, 1916, page 1261.

Power Improvements in Kansas City

The Kansas City (Mo.) Railway has outlined a plan of improvements, following closely the suggestions of Edward N. Lake of the Krahbier Company, Chicago, Ill., who made a survey several months ago. The chief changes are in the distribution of power. They involve abandonment of two substations this year, and a third later, and the establishment of five others at various locations this year and two more later. A portable automatic substation has already been ordered for delivery this summer.

The only equipment for the new substation to be bought now is a 3000-kw. rotary converter. Eventually, three 1500-kw. rotary converters, one 2000-kw., three 1000-kw., one 800-kw., one 600-kw. and four 750-kw. converters will be installed in the new substations. Some of the equipment will come from the stations abandoned. Under the plan outlined, the company will within a year have thirteen substations and twenty-eight converter units of a total capacity of 35,500 kw. Switchboard equipment is to be standardized so that units may be moved or replaced readily.

The new equipment is to be planned with the end in view of ultimately using automatic equipment, either through the purchase of automatic converters or the equipment of smaller units with automatic devices.

Extensive improvements are to be made at the power plant, and other places. Forty-three thousand dollars is to be spent on overhead lines. The total of expenditures is estimated at \$370,000, including \$100,000 for the power plant, \$161,000 for the substations and \$30,000 for the switch house. The company has more than twenty sizes of cables in use. This number will be reduced to four or five.

Hearing on Philadelphia Petition

The hearing before the Public Service Commission of Pennsylvania on the application of the city of Philadelphia for authority to construct the proposed high-speed lines was continued on Feb. 15. W. S. Twining, director of the department of city transit of Philadelphia, declared construction of the proposed comprehensive high-speed system to which the city is committed would cost between \$90,000,000 and \$91,000,000. This is approximately \$28,000,000 more than was ever before officially anticipated. The director based his increased estimate upon the inflated prices of materials and labor. He asserted that were the city to attempt independent operation of the lines the cost would be increased to approximately \$105,000,000. The lines could be equipped by the city for approximately \$14,000,000. E. A. Ballard, counsel for the Philadelphia Rapid Transit Company, stated the case of the company as follows:

"I take it the city is committed to the construction of a comprehensive high-speed transit system, and if a fair agreement can be reached the greatest number of citizens will derive the greatest benefit from such a system. The terms of the Philadelphia Rapid Transit Company for leasing the lines will, if passed upon by Councils, eventually be placed before this commission. I take it the commission at present is considering the question of construction. The great problem is what shall be built. Shall the city undertake the expenditure of \$100,000,000 with \$63,000,000 on hand, looking at the future hopefully, or will it cut its coat to fit the cloth in hand and close its eyes to the future? Our position is that when and if the city builds the lines, we will operate them whether they are long or short lines, if the lease is ratified. When that question is placed before the commission I shall discuss it and shall answer some of the questions raised here to-day."

Cleveland Subway Considered

Resolution Adopted Calling Upon Subway Company to Show Why Its Franchise Should Continue

By unanimous vote the City Council of Cleveland, Ohio, on the evening of Feb. 19 adopted a resolution calling upon the Cleveland Rapid Transit Company to submit a report showing why its franchise should not be revoked. The resolution had been approved by the street railway committee. W. R. Hopkins, president of the company, was present at the committee hearing in the afternoon, and asked that the demand for a report be delayed. He said that if it had not been for the war, the underground railway which the company proposes to build would have been in operation, and that he will be disappointed if work is not begun this year.

Councilman Clayton C. Townes said the franchise should be revoked at once in order to clear the way for the construction of municipal subway terminals. Mr. Hopkins, however, pointed out that the city had as yet made no investigation of the proposition that has been discussed, and that its engineers do not yet understand the obstacles that will be encountered. He said that \$10,000,000, the amount of money named, will hardly be sufficient to build terminals so extensive as contemplated.

The franchise to the Cleveland Rapid Transit Company was conditioned upon the company spending \$500,000 in construction work within a stipulated period. It is contended now that this period has elapsed, thus giving the Council the right to revoke the grant whenever it sees fit. The matter will depend upon the report that is made and the possibilities of construction work being commenced within a reasonable time.

Cincinnati Agreement Likely

It is said that an agreement for the lease of the proposed rapid transit loop at Cincinnati, Ohio, to the Cincinnati Traction Company will be closed soon. Charles A. Groom, city solicitor, submitted a tentative draft of the lease on Feb. 20 to attorneys representing all the interests. It embodies all the proposals made to the company by the conference committee from the City Council and the Rapid Transit Commission, except the clause relating to the distribution of the earnings from the joint operation of the loop and the surface lines. As yet the city and company have not been able to agree on this point.

The tentative lease provides that the company shall surrender its present franchise for another franchise which will govern the joint operation of the loop and the surface lines, universal 5-cent fare and transfer by the shortest route, use of the interurban entrance by all interurban railways upon an equal and uniform contract basis, right of the city to regulate service and rates of fare, and the right of ordering the building of extensions, subject to the appeal of the company, and the right of the city to purchase the surface lines at a price to be established by agreement.

Cleveland Allowance Adjusted

At a conference between J. J. Stanley, president of the Cleveland (Ohio) Railway, and the street railway committee of the City Council on Feb. 24, an arrangement was made that will avert the threatened break on the question of operating allowance. In order to avoid arbitration, Mr. Stanley proposed a compromise figure of 14½ cents per car mile. He had asked for 15 cents. The committee and Street Railway Commissioner Sanders had insisted upon 14 cents, or an increase of one-half of 1 cent over the previous allowance.

It is estimated that this will cover the increase in wages which the motormen and conductors will receive, beginning on May 1, and provide for betterments in the service. Mr. Stanley stated that the increase in service will be about 7½ per cent. It is stated, however, that the increase should be 12 per cent in order to keep pace with the demands of traffic. The additions to the service during the last year were slight. For this reason they should be greater than ordinary this year.

The committee has agreed to the plan to charge off im-

mediately \$100,000 of the \$195,000 operating deficit. The remaining \$95,000 is to be charged off at the rate of \$6,000 a month. The entire maintenance deficit of \$268,000 is to be charged off at the rate of \$10,000 a month.

Mr. Sanders and members of the committee expressed the belief that the settlement will not affect the rate of fare for the present, although it reduces the interest fund to \$460,000. It does, however, increase very materially the amounts to be charged off monthly and would seem to place the company where it will be impossible to accumulate a surplus at the same rate that would have been possible had the deficits been made good in a lump sum.

\$340,000 Grade Elimination

Last Grade Crossing in Electrified Zone on New York Central's Main Line to Go

Upon an opinion by Chairman Van Santvoord, the Public Service Commission for the Second District of New York has decided that the so-called "Village-Railroad" plan for the separation of the New York Central's main tracks from the street grades at Tarrytown should be adopted. The commission makes no order at this time, waiting for agreement to this decision by the railroad, the village and others interested. The cost of the project will be about \$340,000.

The proceedings for this elimination had been pending before the commission and its predecessor for eleven years. Mr. Van Santvoord says that while the idea now adopted by the commission may not be an ideal plan, the circumstances make an ideal plan impossible. The commission now has funds which it can devote to this work and Mr. Van Santvoord says that unless the necessary agreements are immediately made for this plan, which he considers to be the best that can be devised, the work will again be put off, and the operation of four tracks of one of the country's greatest trunk lines through the streets of a prosperous and growing community will continue to be an increasing menace to safety and a hindrance to proper operation.

This is the last grade crossing to be eliminated in the electric zone of the New York Central's main line and Harlem division. The plan finally adopted is one which the chairman finds was submitted in 1911 and has been consistently favored by the municipality, the railroad corporation, the engineers of the commission and by a very considerable, if not actual, majority of the taxpayers and residents of Tarrytown.

I. R. T. Regales Employees' Ball Teams

Champions of Company Baseball League Receive Tribute from President Shonts, National League Executives and Prominent Railroad Men

Railway officials and employees were united by ties of genuine baseball enthusiasm on Feb. 28 when the Interborough Rapid Transit Company, New York, N. Y., with Theodore P. Shonts, president, as toastmaster, honored the members of the Interborough Baseball League, composed of five teams representing the different departments of the company, with a dinner at Reisenweber's restaurant. Amid the applause of about 200 who attended, the league pennant was presented to the champion team, composed of men from the car equipment department, and Harry Hempstead, president of the New York Giants, gave a loving cup to Fred Banker of the equipment department team as the best all-around player.

A warm introductory welcome by Mr. Shonts, who was himself an active devotee of the national game during his college years, was followed with speeches by John K. Tener, former governor of Pennsylvania, and now president of the National Baseball League; John B. Stanchfield, who related how he came to pitch the first curved ball; H. H. Vreeland, director of the Welfare League of the Interborough; F. B. Lincoln, general manager of the Erie Railroad; Patrick E. Crowley, vice-president of the New York Central Railroad; R. V. Massey, general superintendent of the Pennsylvania Railroad; W. J. Fripp, general manager of the New York Central Railroad; R. S. Parsons, chief engineer of the Erie Railroad, and John Whalen, former corporation counsel, and Daniel Brady, of the Brady Brass Company.

City to Answer St. Louis Company.—Announcement was made on Feb. 21 by the chairman that an answer by the city to the compromise proposed by the United Railways for the settlement of the mill tax and franchise problems would be considered on Feb. 28 at a meeting of the public utilities committee of the Board of Aldermen of St. Louis. Statistics from other cities, on which the answer and counter offer will be based, will be presented to the committee by C. E. Smith, consulting engineer of the committee.

Toledo Rental Question Considered.—The question of requiring the Toledo Railways & Light Company, Toledo, Ohio, to pay a rental of \$185 a day for the use of the streets occupied by its tracks was considered by the street railway committee of the City Council on Feb. 21. Officers of the company were later notified to appear before the committee at the next meeting to show why the company should not pay such a rental. If the ordinance making this provision is passed, the money will be used in repairing the streets occupied by the tracks.

West Side Hearings Continued.—The Board of Estimate of New York City continued on Feb. 26 its public hearings on the plans and form of agreement for the track changes as decided upon between the New York Central Railroad for its west side line in the city. Mayor Mitchel has stated that full opportunity will be afforded for critics of the plan and form of agreement to be heard. The plans are to be re-studied by a board composed of experts who are members of architectural landscape societies, engineering societies and civic organizations. This new study is expected to occupy several months.

Trial of Commissioner Wood Postponed.—The case of Robert Colgate Wood, formerly a member of the Public Service Commission for the First District of New York, indicted on the charge of attempted bribery, which was set for trial on Feb. 26 before Judge Nott in General Sessions, was postponed until March 12 on application of Frank Moss, counsel for Mr. Wood. Mr. Wood was indicted as a result of testimony before the Thompson committee alleging that he had demanded \$5,000 when he was Public Service Commissioner for his approval of the signal contracts for the new Center Street subway loop. In requesting the adjournment Mr. Moss said he had been ill and had not had time to prepare his client's case.

Executive Committee of Pacific Coast Association Meets.—The regular annual meeting of the executive committee of the Pacific Coast Electric Railway Claim Agents' Association was held in Portland, Ore., on Feb. 20, in the offices of Secretary-Treasurer B. F. Boynton, who is claim agent of the Portland Railway, Light & Power Company. The principal reports read at the convention were from the legislative, safety and subjects committees. The executive committee expressed itself as strongly in favor of uniform legislation, as well as a standardization of all safety first rules and regulations regarding accident prevention and traffic problems. It was decided by the committee to hold the annual convention of the association in Portland, Ore., on July 18, 19 and 20.

I. T. S. Not Subject to St. Louis Mill Tax.—The Board of Aldermen of St. Louis, Mo., will be advised by City Counselor Daves that in his opinion the Illinois Traction Company cannot be compelled to pay a mill tax on each passenger similar to that paid by the United Railways. This opinion will be in answer to a resolution introduced by Alderman Schwartz directing the city counselor to take legal steps to collect a mill tax from the line. The resolution was referred to the public utilities committee for an opinion as to the chance of winning such a mill tax suit. Mr. Daves will base his decision on an opinion written some time ago by former Associate City Counselor Truman Post Young, holding that the city has no power to levy such a license tax on an interurban company in interstate commerce traffic.

Fort Wayne & Northern Indiana Increases Wages.—Sam W. Greenland, general manager of the Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind., recently announced that all motormen and conductors on both city and interurban lines would receive a voluntary increase in wages of 2 cents an hour, effective on March 1. The order affects 500 trainmen and the increase represents an

additional outlay by the company of \$40,000 a year. In Fort Wayne and other cities where the company operates the trainmen now receive from 21 cents to 25 cents an hour. Under the new schedule these men will receive from 23 cents to 27 cents. The interurban trainmen now receive from 22 cents to 29 cents an hour. Under the new scale the rate of pay of these men will be from 24 cents to 31 cents an hour.

Atlanta Dynamiter Sentenced.—L. E. Dodgen, formerly a lineman of the Georgia Railway & Power Company, Atlanta, Ga., was convicted on Feb. 15 in the Criminal Court of Atlanta on the charge that he participated in the dynamiting of one of the company's suburban cars while the street railway "strike" was in progress last fall. The explosion threw the car from the tracks and its momentum carried it against one of the trolley poles. The jury's verdict was returned with a recommendation to mercy, thus limiting to ten years imprisonment the maximum penalty the convicted man could receive. Dodgen was a member of the linemen's union and was one of those who abandoned their work in August, 1916. The failure of the linemen's strike led to an attempt by the leaders to force the company's trainmen into the Amalgamated Association. On Feb. 24 Dodgen was sentenced to serve eight years.

City Formally Rejects Payment.—The City Council of Seattle, Wash., on Feb. 19, directed Comptroller Harry W. Carroll to return to the Puget Sound Traction, Light & Power Company its check for \$64,000, representing 2 per cent of its gross earnings for 1916, due to the city under the terms of its franchise. The company paid this sum on Jan. 15 last, with the express provision that in accepting it the city agreed not to begin suits to compel the compliance with franchise obligations, pending a hearing on the petition for relief filed by the company with the Public Service Commission about two years ago. By refusing to enter into any such agreement, and returning the check, the city places itself in a position to bring action against the company to recover the amount. No announcement has been made by the city officials as to whether any attempt will be made to further penalize the company for its failure to comply with the provision requiring the payment of 2 per cent of its gross earnings annually to the city.

Program of Association Meeting

Central Electric Railway Association

The program has been announced for the annual meeting of the Central Electric Railway Association to be held at the Claypool Hotel, Indianapolis, Ind., on March 8 and 9. The dinner for association members, their families and invited guests will be held on March 8 at 7 p. m. The president of the association will preside at the dinner as toastmaster and there will be short addresses by Charles A. Bookwalter and Joseph A. McGowan. The executive committee will meet on March 7 at 7.30 p. m.

The formal meeting of the association will be opened at 9 a. m. on March 8 with the annual address by President A. Benham. There will follow the presentation of a paper "Revival of Pure Wrought Iron for Railroad Service," by G. G. Roberts, engineer Brown & Company, Inc., Chicago. Following the discussion of this paper addresses will be made by the following past presidents of the association: E. C. Spring, H. A. Nicholl, F. D. Carpenter, George Why-sall, E. B. Peck, W. S. Whitney, A. W. Brady, E. F. Schneider and C. L. Henry.

The session on March 9 will be opened by the consideration of business matters and the presentation of reports of committees. There will follow the presentation of a paper, "The Value of Standards to the Railway Industry," by A. L. Broomall, engineer of the railway department of the Westinghouse Electric & Manufacturing Company. Following the discussion of this paper the past presidents of the association previously mentioned and not heard at the session on March 8 will address the meeting. The session will be concluded with the presentation of the report of the secretary and treasurer and the election and installation of officers for the ensuing year. The new executive committee will meet immediately after adjournment.

Financial and Corporate

Wisconsin Companies Consolidate

Public Utility Companies in Fond du Lac United with Sheboygan Electric Company

Kelsey, Brewer & Company, Grand Rapids, Mich., have acquired the properties owned and controlled by the Eastern Wisconsin Railway & Light Company and the Wisconsin Electric Railway. The purchase includes electric and gas plants at Fond du Lac, Wis., the local street railway in Fond du Lac and an interurban line from Fond du Lac to Neenah, Wis., via Oshkosh with a branch from Oshkosh to Omro, Wis.

These properties are being consolidated with those of the Sheboygan Electric Company as the Eastern Wisconsin Electric Company. Articles of incorporation of this company were filed on Feb. 21 with the Secretary of State at Madison, Wis. The authorized capitalization is \$5,000,000 of common stock, \$5,000,000 of preferred stock and \$20,000,000 of bonds.

The combined properties will have approximately 7800 electric consumers and 3500 gas consumers. The annual sales of electric current are more than 10,000,000 kw.-hr. Gas sales amount to 90,000,000 cu. ft. The company has approximately 102 miles of local and interurban railway. All franchises have been surrendered and the company is operating its properties under an indeterminate permit granted by the Railroad Commission of Wisconsin.

The officers of the new company are Joseph H. Brewer, Grand Rapids, president; Raymond H. Smith, Sheboygan, vice-president; Willis J. Ripley, Grand Rapids, treasurer; Blaine Gavett, Grand Rapids, secretary. No changes in the local managements are contemplated at this time.

Consolidation on Staten Island

Richmond Light & Railroad Company and Staten Island Midland Railway Seek to Consolidate

The Richmond Light & Railroad Company and the Staten Island Midland Railway have filed a petition with the Public Service Commission for the First District of New York, asking for permission to consolidate the two companies under the name of the Staten Island Light & Traction Company, Inc. The Staten Island Midland Railway is engaged exclusively in the railroad business, while the Richmond Light & Railroad Company not only operates a railroad, but is also engaged in the electric light and power business. In their petition the companies say that they entered into a joint agreement on Dec. 1, 1916, to consolidate their interests.

The Richmond Light & Railroad Company asks for authority to execute a mortgage and deed of trust to secure \$7,500,000 face value of first and refunding mortgage 6 per cent gold bonds by the consolidated corporation, and to permit it to issue \$1,350,000 par value of 6 per cent cumulative preferred stock and \$3,291,000 par value of common stock. The application of the Staten Island Midland Railway is for about the same privileges, and asks, in addition, for authority to increase the capital stock of the company from 10,000 shares, par value \$100, amounting to \$1,000,000, to 23,500 shares, par value \$100, amounting to \$2,350,000.

The petition sets forth that it is proposed upon the consummation of the consolidation that the new company shall increase its authorized capital to \$15,000,000 par value, divided half and half between common and preferred stock. This proposed increase is only to be issued as the corporate needs of the company require. Under the proposed new mortgage for \$7,500,000 face value of 6 per cent bonds, which has been consented to by the majority of stockholders of the two companies, it is proposed to issue \$1,730,000 immediately upon the consummation of the consolidation, and to issue the remaining \$5,770,000 as the needs of the new company demand.

Annual Report

Twin City Rapid Transit Company

The comparative income statement of the Twin City Rapid Transit Company, Minneapolis, Minn., for the calendar years 1915 and 1916 follows:

	1916		1915	
	Amount	Per Cent	Amount	Per Cent
Revenue from transportation	\$10,130,113	99.5	\$9,401,233	99.5
Revenue from other railway operation	57,941	0.5	52,731	0.5
Total railway operating revenue	\$10,188,054	100.0	\$9,453,964	100.0
Way and structures	\$1,057,235	10.4	\$995,556	10.5
Equipment	780,235	7.7	728,085	7.7
Power	880,081	8.6	839,673	8.8
Conducting transportation	2,725,761	26.8	2,582,226	27.3
Traffic	45,550	0.4	49,297	0.5
General and miscellaneous	808,472	7.9	909,295	9.6
Transportation for investment—credit	—42,691	0.4	—33,504	0.4
Total railway operating expenses	\$6,254,643	61.4	\$6,064,628	64.1
Net operating revenue	\$3,933,411	38.6	\$3,389,336	35.9
Taxes assignable to railway operation	708,098	6.9	687,454	7.3
Operating income	\$3,225,313	31.7	\$2,701,882	28.6
Income from unfunded securities and accounts	\$26,051	0.2	\$23,658	0.2
Miscellaneous income	374	0.0	269	0.0
Total non-operating income	\$26,425	0.2	\$23,927	0.2
Gross income	\$3,251,738	31.9	\$2,725,809	28.8
Rent for leased roads	\$3,000	0.0	\$3,000	0.0
Interest on funded debt	984,557	9.7	989,843	10.5
Net loss on miscellaneous physical property	18,622	0.2	12,443	0.1
Miscellaneous debits	8,011	0.1	8,248	0.1
Total deductions	\$1,014,190	10.0	\$1,013,534	10.7
Net income	\$2,237,548	21.9	\$1,712,275	18.1

The last calendar year was a prosperous one for the company. The total railway operating revenue showed an increase of \$734,090, or 7.7 per cent, most of this arising from the gain of \$728,880, or 7.7 per cent, in revenue from transportation. The operating expenses increased only \$190,015, or 3.1 per cent, so that the net operating revenue rose \$544,075, or 16.0 per cent. In the operating expense group increases were shown for maintenance of way and structures, maintenance of equipment, power and conducting transportation, while traffic and general and miscellaneous showed decreases.

Taxes assignable to railway operation rose \$20,644, or about 3 per cent, while non-operating income increased slightly, and deductions from income to a less extent. As a result, the net income for the year showed a gain of \$525,273, or about 30 per cent. Regular quarterly dividends at the rate of 7 per cent on the preferred stock and 6 per cent on the common stock, aggregating \$1,530,000, were declared and paid in 1916, and after an appropriation of \$100,000 to miscellaneous reserves a balance of \$1,368,762 was carried forward for the year.

The revenue passengers carried in 1916 totaled 199,848,096, as compared to 185,654,985 in 1915, while the transfers redeemed in the two years were 74,425,935 and 69,259,767 respectively. The ratio of operating expenses and taxes to revenue was 68.17 per cent in 1915 and 71.24 per cent in the year preceding.

During 1916 4.32 miles of track were constructed and put in operation, as follows: Minneapolis, 2.88; St. Paul, 0.90, and suburban, 0.54. The construction of sixty-three cars was authorized, but on account of slowness in delivery of motor equipments, some of these cars are not yet in service but will be at an early date.

Negotiations for the purpose of adjusting the franchise relations of the Minneapolis Street Railway with the city made progress, the greater part of 1916 having been devoted to making valuations of the company's property. The city met the company fairly, the annual report states, and the directors are hopeful that a mutually satisfactory contract will be agreed upon. The officers will proceed with these negotiations as rapidly as practicable.

Formal Empire United Plan

Committee Issues Reorganization Plan—Details for Raising Cash and Exchanging Securities

Under date of Feb. 24 the committee composed of Thomas W. Meachem, Ralph S. Bowen and William A. Mackenzie, acting under the deposit agreement dated Nov. 18, 1915, presented the formal plan for the reorganization of the properties of the Empire United Railways, Inc., Syracuse, N. Y. A preliminary announcement of this plan was made in the *ELECTRIC RAILWAY JOURNAL* of Feb. 17.

NEW CORPORATION TO BE FORMED

In the event that the property of the Empire United Railways, Inc., when sold at foreclosure, is acquired by the committee, a new company is to be organized under laws of New York. This company shall be subject to existing securities composed of \$2,500,000 of first mortgage 5 per cent bonds of the Syracuse, Lake Shore & Northern Railroad and \$250,000 of first mortgage 5 per cent bonds of the Auburn & Northern Electric Railroad. New securities will consist of \$500,000 of three year 6 per cent secured promissory notes of the new company; \$1,000,000 of 6 per cent cumulative preferred stock, Series A; \$1,250,000 of 6 per cent non-cumulative preferred stock, Series B (to rank equally with or be convertible into Series A stock after Series B stock has received five consecutive dividends at 6 per cent), and \$1,500,000 of common stock. The new securities shall be subject to the approval of the Public Service Commission, and any reductions made therein shall be taken as far as possible from the issue of Series A preferred stock.

CASH REQUIREMENTS

The estimated cash requirements under the plan total \$599,300. This sum is made up as follows: Amount necessary to pay defaulted coupons on the Lake Shore bonds, \$125,000; amount necessary to pay interest and various expenses in connection therewith, \$37,500; amount necessary to pay defaulted coupons on the first-mortgage bonds of the Auburn & Northern Electric Railroad and interest, \$13,100; compensation to be paid the managers, Ford, Bacon & Davis, for their agreement to hold themselves in readiness up to July 1, 1917, to purchase or procure the purchase of \$350,000 of the three-year notes, \$15,000; organization expenses, \$17,500; real estate mortgage, \$20,750; car trust obligations, \$45,450, and foreclosure expenses, rehabilitation costs, new construction, improvements, working capital, etc., \$350,000.

The cash requirements of the plan are to be met from the proceeds of three-year notes of the new company, the Series A preferred stock and the funds in the hands of the receivers in the Empire United foreclosure and dissolution proceedings. The cash requirements stated above are merely estimates, and the committee is to have the power if necessary to increase or diminish the amount of three-year notes and Series A preferred stock that may be sold but without varying the consideration or terms of sale.

DIVISION OF NEW SECURITIES

Upon the acquisition by the new company of the properties from the committee, the new company shall issue to the committee as consideration the following securities: Promissory notes, \$350,000; Series A preferred stock, \$700,000; Series B preferred stock, \$1,250,000, and common stock, \$1,500,000. The promissory notes will be sold (or as many thereof as may be determined) to the managers at 95. In the case of the Series A preferred stock the committee shall have the right to sell as much of the issue as it may dispose of at 75 (with additional Series B preferred stock and common stock as provided). The balance of the Series A preferred stock shall be held or placed subject to the two-year option of the managers to purchase ex-dividend at the date of purchase at 70. Of the Series B preferred stock \$250,000 is to be transferred to the managers in part consideration for their agreement to stand ready to purchase the three-year notes and for their services in connection with the plan. The balance of \$1,000,000 shall be held by the committee for use and for distribution among the depositors as hereafter provided. A total of \$500,000 of the \$1,500,000

of common stock to be transferred by the committee to the managers as further consideration as above, and the remaining \$1,000,000 shall be held by the committee for use and for distribution as provided.

DISPOSITION OF SECURITIES TO DEPOSITORS

Each depositor of a \$1,000 Empire United bond who shall on or before March 27, 1917, subscribe to a \$50 assessment, shall receive \$66.66 in Series A preferred stock, \$625 in Series B preferred stock and \$450 in common stock, a total of \$1,141.66. Each depositor not paying the assessment shall receive \$550 in Series B preferred stock and \$400 in common stock, a total of \$950. The assessment may be underwritten by any person or persons satisfactory to the committee. To each holder of unsecured notes or indebtedness the committee may give the privilege of subscribing \$170 for each \$1,000 of such indebtedness, in which event he shall be entitled to \$226.66 of Series A preferred stock, \$200 of Series B preferred stock and \$500 of common stock. The same time limit applies for subscriptions in this case.

The Series B preferred stock and the common stock shall be placed by the committee in a voting trust for five years with three voting trustees, one of whom is to be named by the committee, one named by Ford, Bacon & Davis, and the third nominated by Ford, Bacon & Davis and approved by the committee.

Income Bond Interest Passed

Hudson & Manhattan Railroad Increases Its Cash Reserves by \$340,000

Wilbur C. Fisk, president of the Hudson & Manhattan Railroad, New York, N. Y., has advised the holders of \$33,102,000 of the company's adjustment income bonds that no distribution of interest on these securities will be made on April 1. It is explained that on account of the higher cost of labor, fuel and supplies the expenses have increased, and that a survey of the corporation's affairs made by Stone & Webster disclosed that weakness in the present position lay in the lack of an adequate cash reserve. For these reasons the directors determined to appropriate \$340,000 to the reserve account. This appropriation wipes out the surplus earnings for the period ended Dec. 31, 1916, and makes it impossible for the company to pay interest on the adjustment income bonds.

In their report Stone & Webster said:

"We are of the opinion that the properties are in a high state of efficiency and maintenance, and that the method of operation is excellent; we find that the gross earnings of the company, even though slowly, have been steadily growing, and for the year ended Dec. 31, 1916, were the largest in the history of the company; that while on account of additional cost of labor, fuel, etc., expenses have increased, the net earnings have also shown an increase as large as should be expected under such circumstances.

"We find that the weakness in your present position is the lack of an adequate cash reserve. In our opinion, appropriations should be made to this reserve until a balance of at least \$1,000,000 is reached, even though this will necessitate the temporary cessation of payment of interest on the company's adjustment income bonds."

The financial report of the company for the year 1916 shows gross revenues of \$5,908,348, and operating expenses and taxes of \$2,766,269, leaving a gross income of \$3,142,079, which is an increase of \$119,184, compared with the previous year. The net income applicable to bond interest for the year 1916 was \$2,877,536. Deducting the interest payments on the New York & New Jersey 5 per cent bonds, and on the first lien 5s and first mortgage 4½s, a distribution to income bondholders for the first half year, and an appropriation of \$390,000 as reserves for contingencies (\$50,000 first half; \$340,000 second half) left a balance of \$51,358.

Under the provisions of the adjustment income bond issue no interest is due and payable except when and as declared by the directors out of available surplus. The bonds bear 5 per cent interest, which is non-cumulative until Jan. 1, 1920. For the eleven months of 1913, and for the years 1914 and 1915, 2 per cent per annum was paid. For the six months ended June 30, 1916, the company paid the same rate, the distribution amounting to \$331,020.

Cities Service Stock Increase

Increase in Authorized Issues of Both Common and Preferred to Be Voted Upon on April 3

The annual meeting of the stockholders of Cities Service Company will be held on April 3. In addition to the usual routine matters, stockholders will be asked to ratify the resolutions made by the board of directors on Oct. 5, 1916, reading in part as follows:

"Resolved, That until such time as there has been invested in the property of Cities Service Company or its subsidiaries from the earnings of the company, a sum equal to the entire par value of the preferred stock then outstanding, no dividends shall be paid in cash on the common stock in excess of 6 per cent per annum, unless the company shall for a period of six months have purchased and retired all preferred stock that can be purchased in the open market at 110 per cent of par or less; and be it

"Further Resolved, That until the foregoing has been complied with, no surplus, or portion of surplus, created by an increase due to the re-valuation of assets already carried on the books, may be used as a basis for the distribution of cash dividends on the common stock."

A proposition will also be presented to increase the authorized amount of the company's stocks. The present amount of preferred stock in the hands of the public, \$57,772,776, is very near the limit of the amount authorized, namely, \$60,000,000. When during the ensuing year the company may find it desirable to expand even moderately, there would be no method by which this could be accomplished without the necessity of calling a special stockholders' meeting for the purpose. Accordingly the stockholders will be asked to approve the increasing of the preferred stock limit from \$60,000,000 to \$100,000,000, and the common from \$40,000,000 to \$50,000,000.

Another Portland Conversion Plan

Owners of Common Stock May Exchange One Quarter of Holdings for First and Second Preferred by Paying Twenty-five Dollars a Share

Through a plan just made public, the stockholders of the Portland Railway, Light & Power Company, Portland, Ore., will have the privilege of converting part of their common stock into preferred stock, thereby producing a fund of \$1,250,000, which will be sufficient to take care of existing requirements for construction purposes and floating indebtedness. There will remain \$1,000,000 to be applied on the company's note issue of \$5,000,000, maturing on May 1. Another extension of the notes will then be granted by the holders, who are large owners of the stock.

The plan presented by the directors is to give all shareholders of record of Feb. 1 the privilege of converting one-fourth of their present 75 per cent paid common stock, amounting in par value to \$5,000,000, into an equal amount of fully paid preferred stock, upon payment of \$25 a share for the stock so converted. Half of the new issue of stock will be first preferred and half second preferred, both entitled to 6 per cent dividends. The first preferred dividend will be cumulative from April 1 of this year, but the second preferred dividend will be non-cumulative.

In July, 1915, through conversion of \$5,000,000 of 75 per cent paid common stock, with \$25 a share accompanying, an equal amount of 6 per cent preferred stock similar to that now proposed to be issued was distributed to shareholders. With the consummation of the plan now proposed, the company's capitalization will be \$15,000,000 of 75 per cent paid common stock; \$5,000,000 of 6 per cent fully-paid cumulative first preferred stock and a like amount of 6 per cent fully-paid non-cumulative second preferred stock. No increase will be made in the total amount of stock.

Dividends on the outstanding \$2,500,000 of 6 per cent first preferred stock, accumulated but unpaid up to April 1, amount to \$187,500. When these have been paid the two issues of first preferred will be similar in all respects. The issues of second preferred non-cumulative stock will take equal rank.

According to the official announcement, this is not to be

regarded as an assessment on the common stock. Those who do not participate in the conversion may retain their holdings undisturbed. It is reported that the conversion plan has been underwritten by a syndicate of Eastern stockholders.

In the circular issued to stockholders, it is stated that general business conditions in Portland and Oregon have been improving steadily for some time. Earnings of the company have been increasing for several months, and prospects are reported excellent for continued increase and for results more satisfactory to stockholders than those secured in the last few years.

Foreclosure Sale Confirmed

Court Sanctions Disposal of Syracuse Suburban Lines to Representatives of Bondholders

Justice Irving G. Hubbs has confirmed the sale on Nov. 1 of the Syracuse & South Bay Electric Railroad and the Syracuse, Watertown & St. Lawrence River Railroad, under foreclosure to Attorney Ernest I. Edgcomb, representing the reorganization committee that was acting for the bondholders of the lines.

The reports of the referees named by Judge William S. Andrews a year before his designation to the Court of Appeals were submitted about three months ago. No action was taken by Judge Andrews and the reports passed with the many other details of the reorganization to Justice Hubbs.

The terms of purchase which received the official approval of Justice Hubbs provide in the South Bay sale that Mr. Edgcomb may pay in the bonds of the company not exceeding \$188,000 of the purchase price of \$201,000. This is to be figured at the distributive value of the bonds in case the entire amount had been paid in cash.

Justice Hubbs permits Mr. Edgcomb to turn in bonds worth \$31,000 on the same distributive basis as the bulk of the purchase price of \$35,000 bid for the Syracuse, Watertown & St. Lawrence River Railroad.

The plans of reorganization provide that the present holders of first mortgage bonds of the Syracuse & South Bay Road will receive a \$300 5 per cent mortgage bond and \$600 in new first preferred stock for each \$1,000 bond held. In the Syracuse, Watertown & St. Lawrence River Road arrangements, present first mortgage bondholders will receive a \$200 5 per cent mortgage bond and \$475 of first preferred stock for each \$1,000 held. Holders of other securities will receive an equal amount of second preferred stock for those held. Holders of present first preferred stock of the South Bay line will receive new common stock equal in value to 50 per cent of their old stock. Through this procedure the common stock of both roads previously outstanding will be eliminated. The amount of bonds hitherto outstanding will be reduced from \$375,000 to \$205,000. In order to meet the current expenses and the cost of the receivership, a \$50,000 first lien note issue is proposed. A table showing the basis of exchange of the securities was published in the *ELECTRIC RAILWAY JOURNAL* of Aug. 19, 1916, page 333.

Lehigh Consolidation Progressing

Majority Interests in Transit Company Disclose Price at Which They Will Sell Holdings

Brown Brothers & Company, New York, N. Y., and Edward B. Smith & Company, Philadelphia, Pa., have addressed a circular to the holders of the common and the preferred stocks of the Lehigh Valley Transit Company, Allentown, Pa., in which they say in substance:

"The owners of more than a majority of the capital stock of the Lehigh Valley Transit Company, including the undersigned, have entered into a conditional agreement dated Feb. 7, 1917, to sell all of the stock so held by them at the following prices in cash: \$28 for each share of common stock and \$48 for each share of preferred stock. Accordingly they have agreed to deposit the certificates for this stock, with power of attorney to transfer, with the Girard Trust Company, Philadelphia, to be held by the trust company while the purchasers are making investigations with respect to Le-

high Valley Transit Company and certain other matters involved.

"We have associated ourselves with the purchasers in financing the acquisition of these and other securities, and we expect to share with them in an underwriters' profit in the transaction. We believe that the price at which we have agreed to sell our stock is advantageous and we have stipulated that all other holders of common and preferred stock of the Lehigh Valley Transit Company may deposit their stock, and, if the agreement is consummated, receive the same price for their stock as is to be paid for the stock that we own.

"The following have also agreed to deposit their stock upon the terms and conditions above stated: Charles H. Bean & Company, H. J. Steele, W. A. Wilbur, Lewis A. Riley, Chester Snyder, H. R. Fehr, Estate of Harry C. Francis, Estate of William F. Harrity, Harry C. Trexler, E. M. Young, S. M. Curwen and Thomas G. Ashton."

The stock of the company of both classes is of \$50 par value. The deposit is asked in connection with the plan referred to previously in the ELECTRIC RAILWAY JOURNAL of consolidating the Lehigh Navigation Electric Company and the Lehigh Valley Transit Company.

Birmingham Railway, Light & Power Company, Birmingham, Ala.—The Federal Court has denied the petition of the city of Birmingham asking the court to enjoin the absorption of the Bessemer, Ensley & Birmingham Railway by the Birmingham Railway, Light & Power Company. The decision of the court will enable the litigation connected with the receivership and reorganization of the Bessemer, Ensley & Bessemer Railway to be concluded and the plans of the reorganization committee carried out. As noted in the ELECTRIC RAILWAY JOURNAL for Feb. 3, page 225, the Supreme Court of Alabama recently decided that the Alabama Public Service Commission was within its jurisdiction in ruling that the merger was consistent with the public interest.

Bryan & College Interurban Railway, Bryan, Tex.—A proposition for the organization of a company at Bryan for purchasing the Bryan & College Interurban Railway, the Bryan lighting and water system and the Bryan Power Company, with a view to consolidating these utilities and enlarging the power plant to supply power for the various industries in Bryan and College Station, has been made to the City Council of Bryan.

Georgia Railway & Power Company, Atlanta, Ga.—All of the outstanding \$350,000 of refunding mortgage gold bonds of the Savannah River Power Company have been called for payment at par and interest at the office of the Columbia Trust Company, New York, N. Y., on April 1.

Illinois Traction Company, Peoria, Ill.—The property of the Galva Electric Light Company, Galva, Ill., has been purchased by the Illinois Traction Company. Stone & Webster, Boston, Mass., are offering for subscription at 96 and interest a block of first mortgage 5 per cent gold bonds of the Madison County Light & Power Company, controlled by the Illinois Traction Company, which has guaranteed the bonds as to principal and interest. The bonds are dated 1906, and are due in 1936. The Illinois Traction Company has purchased the properties of the North Missouri Light & Power Company, organized a little more than two years ago to obtain current from the Keokuk power plant and light New London, Center, Perry and Frankford. The purchase price of the property is said to have been \$60,000.

Interborough Rapid Transit Company, New York, N. Y.—A public hearing will be held by the New York Public Service Commission, First District, on March 8 on the application of the Interborough Rapid Transit Company for permission to issue \$16,436,000 of 5 per cent bonds under its first and refunding mortgage of \$300,000,000 entered into on March 20, 1913. The present issue is contemplated in connection with third-tracking and other work upon the lines of the Manhattan elevated system and has been necessitated in part by the increased cost of materials and additional expenses due to high prices incurred in the prosecution of the elevated third-tracking, extension and improvement work.

Kansas City, Kaw Valley & Western Railway, Bonner Springs, Kan.—C. E. Denison & Company, Cleveland, Ohio, are offering at 101 and interest \$200,000 of first-mortgage 6-per cent bonds of the Kansas City, Kaw Valley & Western Railway dated 1914 and due on Aug. 1, 1924, but callable at 101 and interest.

Louisville (Ky.) Railway.—The 1916 report of the Louisville Railway presented at the annual meeting on Feb. 21 showed satisfactory conditions. The gross earnings for the year on the city and country lines amounted to \$3,630,077, and operating expenses and maintenance totaled \$2,992,471, leaving net earnings of \$637,606. Earnings showed an improvement over those under the depression of 1915, in spite of the heavy advances in cost of all materials and supplies. A new line to Shawness Park was put in operation on June 1 by the company and other track improvements were made.

New York (N. Y.) Railways.—The New York Railways has passed the interest usually paid on April 1 on the \$30,626,977 of adjustment mortgage 5 per cent income bonds.

Republic Railway & Light Company, New York, N. Y.—At a meeting of the stockholders of the Republic Railway & Light Company, W. M. Coleman, who has been general counsel for the company, was elected a director to fill a vacancy. The other directors were all re-elected by the stockholders.

St. John (N. B.) Railway.—The shareholders of the St. John Railway have approved the offer of \$140 a share net made to them by the New Brunswick Investment Company, Ltd., for their holdings. The St. John Railway has \$1,000,000 of stock outstanding. The purchase offer was referred to in the ELECTRIC RAILWAY JOURNAL of Feb. 10, 1917, page 268.

West Penn Traction & Water Power Company, Pittsburgh, Pa.—The West Penn Traction & Water Power Company has resumed dividends on the preferred stock, declaring 1½ per cent on that issue covering the quarter ended Dec. 31. This is the first dividend since March, 1914.

Dividends Declared

Central Mississippi Valley Electric Properties, Keokuk, Iowa, quarterly, 1½ per cent, preferred.

Northern Ohio Traction & Light Company, Akron, Ohio, quarterly, 1¼ per cent, common.

Rochester Railway & Light Company, Rochester, N. Y., quarterly, 1¼ per cent, preferred.

Terre Haute Traction & Light Company, Terre Haute, Ind., 3 per cent, preferred.

Washington Railway & Electric Company, Washington, D. C., quarterly, 1¼ per cent, preferred; quarterly, 1¼ per cent, common.

Electric Railway Monthly Earnings

ATLANTIC SHORE RAILWAY, SANFORD, ME.						
Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income	
1m., Jan., '17	\$22,902	*\$24,642	†\$1,740	.....	.....
1 " " '16	23,287	*19,916	3,371	.....	.....
CITIES SERVICE COMPANY, NEW YORK, N. Y.						
1m., Jan., '17	\$1,854,449	\$21,729	\$1,832,720	\$297	\$1,832,423	
1 " " '16	663,543	18,215	645,328	42,966	602,362	
12 " " '17	11,301,249	242,904	11,058,345	216,291	10,842,054	
12 " " '16	4,717,443	178,143	4,539,300	492,132	4,047,168	
LAKE SHORE ELECTRIC RAILWAY, CLEVELAND, OHIO						
1m., Dec., '16	\$149,815	*\$97,916	\$51,899	\$36,558	\$15,341	
1 " " '15	123,811	*76,891	46,920	36,095	10,825	
12 " " '16	1,618,551	*1,022,712	595,839	436,647	159,192	
12 " " '15	1,387,143	*898,136	489,007	433,203	55,804	
REPUBLIC RAILWAY & LIGHT COMPANY, YOUNGSTOWN, OHIO						
1m., Dec., '16	\$373,412	*\$214,071	\$159,341	\$81,746	†\$82,274	
1 " " '15	320,869	*167,891	152,978	70,782	†82,158	
12 " " '16	3,987,616	*2,327,407	1,660,209	827,569	†853,606	
12 " " '15	3,121,296	*1,874,082	1,247,214	688,952	†560,014	
TWIN CITY RAPID TRANSIT COMPANY, MINNEAPOLIS, MINN.						
1m., Jan., '17	\$897,932	\$612,161	\$285,771	\$149,363	\$136,408	
1 " " '16	830,283	543,199	287,084	145,952	141,132	

*Includes taxes. †Deficit. ‡Includes non-operating income.

Traffic and Transportation

Rehearing Asked in Fare Case

City of Los Angeles Asks Railroad Commission to Reconsider Its Decision in Suburban Fare Ruling

The city of Los Angeles, Cal., through its Board of Public Utilities, threatens to compel the Pacific Electric Railway to remove its cars from the city's streets unless the 5-cent rate is extended to Bairdstown, approximately 6 miles east of the business section; Palms, about 8 miles southwest of the business section, and to a number of other outlying sections, all of which have been made a part of the city within the last three years. The State Railroad Commission recently rejected the city's application for 5-cent fares in these cases on the ground that the Pacific Electric Railroad is already operating at a loss and that it would not be fair to compel the company to suffer further loss.

The latest chapter in the controversy is the action of the city attorney, upon the request of the Board of Public Utilities, in filing an application for a rehearing before the State Railroad Commission. In making this request of the city attorney the board asserted that the losses the railway set up before the commission in the statement of its general financial condition are entirely due to conditions outside the city and over which the city has no control. The local board maintains that any discussion of the financial condition of the company is outside the 5-cent fare case because only 8 per cent of the mileage of the Pacific Electric Railway is within the city while 92 per cent is outside of the city. The Board of Public Utilities of Los Angeles concluded its statement as follows:

STATEMENT OF BOARD

"In view of the Railroad Commission's opinion that the Pacific Electric Railway was an entirely interurban system, the city is forced to take under consideration the advisability of having the Pacific Electric Railway stop all its interurban cars at every crossing, either for the entrance or discharge of passengers, until such time as the Pacific Electric Railway could make arrangements to take its cars off the city streets, either over elevateds, or through subways, and that the company retire from the local business entirely, leaving the field to the Los Angeles Railway."

In commenting on the threat of the Board of Public Utilities, Frank Karr, chief counsel for the Pacific Electric Railway, said:

"The Pacific Electric Railway always has been operated as a complete unit for the benefit of the entire country served, and we have never been able to segregate the weak and strong lines. I am sorry that a suggestion has been made that the through service might be interrupted by excessive stops. While, of course, it must be conceded that the city might have the power to do this, I do not believe it would be to the interest of city or the traveling public to cut down our running time to outside points. Los Angeles benefits from the bringing in daily of thousands of people from outlying districts. Millions of dollars are brought into the city every year in trade, and thousands of people do business in the city and maintain their homes in the suburbs.

"It will be remembered that at the last hearing before the City Council we pointed out that the Bairdstown business does not pay operating expenses, and that we would, if the Council desired, take up seriously with the city the question of giving up our city service in this section and turning over the business to jitney operation, if we could be relieved from the necessity of making any stops between Sierra Vista and Covina Junction."

The decision of the Railroad Commission dismissing the applications of Palms, Richardson, Bairdstown and other sections of Hollywood, to reduce fares on the Pacific Electric Railway to a 5-cent basis, was referred to at length in the issue of the ELECTRIC RAILWAY JOURNAL of Feb. 10, 1917, page 269.

Seven-Cent Fare Hearing

Proposed New Rate on Worcester & Warren Street Railway Suspended—Case Closed

The Public Service Commission of Massachusetts gave a public hearing recently at Boston upon the proposed institution of a 7-cent fare unit on the Worcester & Warren Street Railway. Frank L. Palmer, president of the company, stated that the road has 19.6 miles of main and branch line track. The main line extends for 16 miles along the State highway between Boston and Springfield. It is the successor of the Warren, Brookfield & Spencer Street Railway and no dividends have been paid since 1901. In April, 1915, the road went into the hands of a receiver. As a result of reorganization all the stock and current liabilities of the old company were wiped out. The company has at present outstanding \$116,600 in stock and \$52,000 of bonds. The investment per mile has been reduced from \$18,316 to \$9,384, which is the third lowest of any company in the State. The company generates its own power and has been unable to purchase electricity more economically from any of the hydroelectric or central station companies within its territory.

Mr. Palmer said that the present cash fare is 6 cents. Workingmen's tickets are issued at present at the rate of 100 tickets for \$5 and school tickets are available for teachers. With the proposed 7-cent rate, half-fare school tickets will be issued but these will not be honored when presented by teachers. It is proposed to eliminate the workingmen's special tickets and to reduce from 6 years to 5 years the age limit of children carried free. A single fare will also be charged per package carried on the platform. Fare zones vary from 3.9 miles to 6.96 miles in length, the average being about 5 miles. The present rate for through fares varies from 1.31 to 1.86 cents per mile and the proposed rates will vary from 1.53 to 2.17 cents. The towns and villages are so situated as virtually to preclude an additional fare zone. The operating revenue was \$45,952 in 1916, or \$20,000 less than in 1903, and in the past six months there was a deficit of \$338. The revenue passengers fell from 1,367,515 in 1903 to 783,833 in 1916. Only three passengers were carried per car-mile last year. The population of the five towns served by the company is 4869 less than when the road was built. The present tributary population is 16,556. The operating revenue per car-mile in 1916 was 17.59 cents; operating expenses were 15.61 cents, and the net was 1.98 cents, the last comparing with the Massachusetts average of 8.99 cents.

The cost of power for 1916 was 1.9 cents per kilowatt-hour exclusive of interest and depreciation. There was a 10 per cent wage increase in May, 1916. Mr. Palmer said that a total revenue of \$55,920 is necessary to meet the company's obligations, including a 7 per cent dividend allowance. The road needs further reconstruction and improvement to the extent of at least \$50,000. It is doubtful if more than \$5,000 additional revenue can be obtained from the proposed increase, considering probable loss in traffic following the higher rate. The distance between towns is too short for the provision of additional fare zones. One-man cars are under consideration as a partial solution of the company's difficulties. The hearing was closed, and subsequently the commission issued an order further suspending the proposed increase in rates until April 1.

Railway Gets Bus Franchise

A franchise to operate lines of motor buses in the southeastern part of the city of Portland, Ore., was granted by the City Council on Feb. 14 to Stephen Carver, president of the Portland & Oregon City Railway, under the name of the Portland Trackless Car Company. This is the first of three franchises asked for by Mr. Carver.

The franchise will go into effect in sixty days unless the referendum is invoked to block it. The Jitney Drivers' Union has fought the issuing of any franchise to Mr. Carver, and it is thought likely that it may attempt to refer the franchise to the people.

A duration of three years is provided for the franchise, which also makes provision for a 5-cent fare, and the privilege of transfer, not only on other buses of the same system, but also on cars of the Portland & Oregon City Railway.

Withdrawal of Transfers Justified

Commissioners Base Their Approval of Transfer
Withdrawal on Inequality of Fares and Pros-
pect of Devoting Added Revenue to
Betterment of Service

In discussing the decision of the Public Service Commission of New York, Second District, in permitting the United Traction Company, Albany, N. Y., to withdraw the transfer privileges to and from the Albany-Troy and Albany-Cohoes interurban lines and the city lines in all three cities, as announced in last week's issue of this paper, the opinion of the commission, written by Commissioner James O. Carr, was set forth in part as follows:

"It needs no argument to support the contention that street railway passengers cannot be profitably carried these distances (over city lines and to interurbans on transfers) a large part of which is in cities and over paved streets, for less than 1 cent per mile. We are not attempting to determine this case upon any question of the physical valuation of the property of the United Traction Company, or upon its urgent need for additional revenue, which it probably should have, but upon the sole ground of the inequality of fares as between the city line passengers and those making use of the city lines as well as the interurban lines for the purpose of reaching their destinations, as we think that this is the proper basis for the disposition of this case."

The opinion, nevertheless, contains a comprehensive review of the financial history of the United Traction Company and its relations with the Delaware & Hudson Railroad and Hudson Valley Railway. Mr. Carr, supported by Commissioners Van Santvoord and Irvine in concurring opinions, criticizes the financial policy of the company which was responsible for an issue of \$7,500,000 of United Traction Company stock for the purchase of the Hudson Valley Railway and the policy which has paid dividends on a \$12,500,000 capitalization during years when these moneys should have been turned back into the company for the rehabilitation of the property and for the accrual of a reserve against depreciation.

Mr. Van Santvoord in his opinion bases his approval of the withdrawal of the transfers on the knowledge that the added revenue will be devoted to the betterment of the service rather than upon the theory that the transfer privilege constitutes a practice so discriminatory as to be abolished under the law. He says that he is willing to compel the Delaware & Hudson Railroad to "go the limit" in providing funds or credit to the United Traction Company. He alludes to the railroad company as the "mother-in-law" of the traction company, and all of the Commissioners agree that the "mother-in-law" has received an ample return for its interest in therolley concern.

Street Railway Problems Acute

Increased Industrial Activity in Buffalo, Rochester,
Binghamton and Rome Causes Congestion

Immediate steps for the betterment of the Buffalo street railway situation are presaged in the action of the Public Service Commission for the Second District of New York at its meeting in Albany on Feb. 28, upon the renewed insistence of Commissioner Hodson. Chairman Seymour Van Santvoord, who has hearings scheduled for Buffalo in other matters during the week beginning March 5, expressed his willingness to take up the street railway matter at the same time. On Commissioner Hodson's request Inspector Barnes will accompany the chairman. Such immediate steps will be taken, irrespective of any lengthy formal survey, as will bring prompt relief.

While the condition of street railway traffic in several other parts of the State, where facilities are being strained by the increased industrial activity, make a formal survey of the Buffalo service impossible for some time to come, the sense of the commission at the meeting on Feb. 28 seemed to be that more effective measures can be taken in the shorter method outlined. As stated elsewhere in this department of the *ELECTRIC RAILWAY JOURNAL* the commission

in this informal way has just succeeded in straightening out a traffic situation in Binghamton. Conferences between Mr. Barnes and city officials and officers of the New York State Railways in Rochester and Rome are now in progress and promise the satisfaction of a number of complaints that have been made in those cities.

Buses for Auxiliary Service

The Board of Public Works of San Francisco has awarded a \$29,550 contract to the White Company for five auto buses to be used in auxiliary service by the Municipal Railway system, for delivery within 120 days.

These five buses are the first to be purchased by the city for this kind of service. They will be operated across Golden Gate Park, connecting Richmond and Sunset Districts, and providing the latter with a direct-to-the-ferry route. From the present terminal of the Municipal line at Tenth Avenue and Fulton Street the buses will run across the park to Ninth Avenue and Lincoln Way, thence to Judah Street, and out Judah Street to Thirty-third Avenue. There may be a later extension to the Ocean Beach if warranted.

The new buses will be inclosed, semi-convertible, single-deck, prepayment type and arranged for one-man operation. The seating capacity will be nineteen, with a total capacity of thirty passengers.

In reporting on the bus route, the city engineer stated that any such route once established must be maintained until replaced by railway operation. This is necessary, he pointed out, so that the district served may enjoy that full measure of growth which depends upon permanently established service.

The city also has agreed, upon the request of the State Harbor Commission and the recommendation of the city engineer, to establish a bus service upon the Embarcadero, operating between Fishermen's Wharf on the north and the channel on the south. This service, however, is not to be provided until the Harbor Commission shall have laid a smooth pavement along this route and this work will probably require from six to nine months.

Service Changes at Rochester

Among Other Adjustments, Schedules Will Be
Lengthened in Order to Prevent Bunching of Cars

As result of a conference held recently before the Mayor of Rochester, N. Y., the following service changes, approved by Charles R. Barnes, electrical expert of the Public Service Commission of New York, Second District, have just been put into effect on the Rochester lines of the New York State Railways:

Schedules have been revised on different lines, giving a longer running time, particularly during rush hours, in order to increase regularity in headway by absorbing minor delays and reducing the bunching of cars.

The efficiency of the dispatching system, which has recently been curtailed, will be in future operated to its fullest capacity and will be a factor in improved service.

The inspectors have been rearranged so that a sufficient number will be located at points on the system where they can best look after the movement of cars, especially during rush hours. At other times these men will be riding the cars on the different lines.

Orders have been issued for strict enforcement against running by passengers at street corners.

In addition to these changes J. F. Hamilton, the newly appointed general manager of the company, has announced the absorption of the service improvement department by the general manager's office. This means that in the future all complaints will be either considered or handled by the general manager, in order that he may have closer working arrangements with the public.

Washington Jitneys to Be Regulated by Service Commission.—The Washington State Senate on Feb. 20 passed the joint public utilities committee bill, providing for the regulation of jitneys by the State Public Service Commission.

Louisville Plans to Eliminate Grade Crossings.—The Engineers and Architects Club of Louisville, Ky., has called on all the other technical and commercial as well as civic organizations to co-operate with it in making arrangements for a thorough survey of the city, partly with a view toward eliminating grade crossings.

Near-side Stop in Galveston, Tex.—Near-side stops for street cars were authorized in Galveston, Tex., on Feb. 23, when the recently enacted traffic ordinances became effective. C. S. McLin, traffic superintendent of the Galveston Electric Company, has had shell walks and alighting places placed on the near side of all unpaved streets.

School Fare Bill Introduced in New York.—A bill has been introduced in the Assembly of New York which provides for the sale of half fare tickets by street railways to the pupils of public schools, good on school days and between fixed hours. The act, if passed, will go into effect on June 1. It has been referred to the committee on railroads.

Instructors for East St. Louis Platform Men.—In order to improve its train service the East St. Louis & Suburban Railway, East St. Louis, Ill., has employed two instructors for its employees. One for the conductors and the other for the motormen. Among the matters to be discussed are the loading and unloading of passengers, the methods of fare collection, and the keeping of the doors closed.

Atlantic City Line Issues Live Folders.—The Atlantic City & Shore Railroad, Atlantic City, N. J., has recently started for the benefit of its patrons the weekly publication of a four-page pamphlet, entitled "Trolley Talks." The pamphlets, each issue of which is printed in different colored ink, reflect the versatility of their editor in presenting by varied aspects the conveniences and facilities of service which this trolley system provides. The points conveyed by the text are sharpened by the frequent insertion of small cartoons.

Lexington Cars Solicit Lighting Contracts.—Cars of the Kentucky Traction & Terminal Company, operating the Lexington, Ky., city service, and affiliated with the Lexington Utilities Company, are serving as "sandwich men" for the lighting branch of the organization. On the front ends of the cars signs announce that four-room cottages will be wired by the company for \$26 and the rear end signs refer to six-room cottages, wired for \$36.

B. R. T. Pays \$174 in Bonuses.—Bonuses for the year 1916, amounting to a total of \$174, have been distributed to thirty-six men at the elevated-subway maintenance shops of the Brooklyn (N. Y.) Rapid Transit System as a reward for their vigilance in the finding of loose or cracked wheels, loose or cracked tires, broken or cracked spring plank hangers, equalizer bars and Gibbs motor suspensions, on the elevated and subway equipment, and the reward was made at the rate of \$2 in each instance.

Jitneys Unrestrained in Dallas, Tex.—Jitneys in Dallas, Tex., are running without restraint since the injunction was recently granted in the district court in favor of the jitneys and against the city, declaring the ordinance recently enacted by the city unfair and unreasonable. The city has perfected an appeal to the Court of Civil Appeals, but it will be several weeks before a decision can be had. In the meantime the city attorney ruled that since the old jitney ordinance had been repealed by the city in the enactment of the new ordinance, the jitneys could secure injunctions against any old ordinance that the city might attempt to enforce.

Safety Work of Kansas City Railways.—W. S. Woodland, safety director of the Kansas City (Mo.) Railways, has in the past school season made safety talks, illustrated with moving pictures, to every public school in Kansas City, Mo., and Kansas City, Kan., except a few very small ones in the outlying districts. Every school child has received one of the safety buttons provided by the company. The board of education recently authorized the placing of bulletin boards in each school having manual training, for the posting of National Safety Council and other bulletins on safety, to be provided by the railways company. There will be ninety-six of such boards.

Grand Rapids Railway Talks to Public.—The Grand Rapids (Mich.) Railway has printed a full-page advertisement in the *Michigan Tradesman* entitled, "Another

Friendly Talk to a Friendly People by a Friendly Company," which contains a frank discussion of some of the company's problems. In analyzing its receipts for the year the company states that its 1916 gross receipts increased only 10 per cent as compared with the increase in Grand Rapids of 30 per cent in bank clearings, 5 per cent in building and 17 per cent in deposits. The small increase in the company's gross receipts was still further offset to some degree by the increase in expenses.

Wilkes-Barre Jitneys Lose in Court.—In an opinion by Justice Potter, the Supreme Court of Pennsylvania has affirmed, with certain modifications, the decree of the Common Pleas Court of Luzerne County, which was appealed from by the Jitney Bus Association of Wilkes-Barre. The suit of the jitney owners, in their fight to run autos carrying passengers for 5 cents a head or six rides for a quarter, was directed against the city of Wilkes-Barre, which, under the act of June 1, 1915, passed an ordinance requiring the operator of every jitney to furnish a \$2,500 bond to insure the payment of any damage resulting from the operation of his car. The terms of the ordinance were regarded as harsh and unreasonable and intended to put the jitney people out of business.

Application Against Illinois Two-Cent Rate Denied.—Application of the Illinois Central Railroad and twenty-seven other railroads to enjoin enforcement of the Illinois 2-cent passenger rate was denied on Feb. 23 by Associate Justice Clarke of the Supreme Court. At a recent hearing before Justice Clarke the railroads sought a writ to suspend the State's 2-cent law pending their appeal to the Supreme Court from dismissal of their suit by Federal District Judge Landis. Attorney-General Brundage and other counsel representing the Illinois Public Utilities Commission opposed the railroads' application. In a memorandum opinion given on Feb. 23 in the proceedings, Justice Clarke said that, even assuming an individual justice had authority to suspend the Illinois rates pending appeal, and that that authority is not clear, he would deny the railroads' application.

High Costs Handicap Spokane Jitneys.—In order to handle all passenger traffic in Spokane, 730 jitneys would be required, a condition it holds to be impossible of realization, according to a recent report of the traffic situation in Spokane, Wash., submitted to the Washington Public Utilities Commission. Now the jitneys take care of only 10 per cent of the passengers. The high operating cost is held responsible for the failure of the jitney bus to make more rapid strides. The lowest figure this cost can be set at for any jitney is \$4.36 daily. The average daily earnings are \$7.50. Taking from the latter amount State and city taxes, insurance, garage expense and depreciation of the cars, little is left to pay the driver. The relative average percentages of the city's traffic carried by the three transportation companies is estimated as follows by the survey: Washington Water Power Company, 52.5; Spokane Inland Empire Railroad, 37.6, and the Jitney Association, 9.9.

Binghamton Traffic Matters Settled at Conference.—At a conference between C. R. Barnes, electric railroad inspector of the Public Service Commission of the Second District of New York, Alderman Bull, Alderman Robinson and Alderman Carman of Binghamton, N. Y., on Jan. 13, it was decided that the three aldermen should confer with the officials of the Binghamton Railway in regard to the complaint with respect to service over that line, noted in the *ELECTRIC RAILWAY JOURNAL* of Jan. 27, page 186, and then communicate with Mr. Barnes in regard to the outcome of the conference. Alderman Carman has reported to Mr. Barnes in a letter dated Feb. 5 that at the conference with F. L. Fuller, president of the Binghamton Railway, and C. S. Banghart, vice-president and general manager of the company, the officers of the company were glad to meet the representatives of the city half way. Mr. Carman expresses the opinion that the service has been greatly benefited by the conference with Mr. Barnes and the street railway officials. He has also thanked Mr. Barnes on behalf of the committee for his interest in the local situation in Binghamton.

Personal Mention

C. E. Anderson has resigned as land commissioner of the Illinois Traction System, with offices at Champaign, Ill.

F. M. Martzall has been appointed to the newly created position of purchasing agent of the Jacksonville (Fla.) Traction Company.

I. M. Stover, formerly manager of the Key West (Fla.) Electric Company, has been appointed manager of the Baton Rouge (La.) Electric Company.

H. D. Whitmore, who has been connected with the West Virginia Traction & Electric Company, Wheeling, W. Va., has been appointed general manager to succeed R. D. Jennison.

Frederick L. Hopkins, formerly treasurer of the Blue Hill Street Railway, Canton, Mass., has been appointed to a position in the treasurer's department of the Boston office of Stone & Webster.

C. B. Nellis has been appointed acting division superintendent of the Cayadutta Division of the Fonda, Johnstown & Gloversville Railroad, Gloversville, N. Y., to succeed the late C. Banker.

John Zarr, for eleven years master mechanic of the City Light & Traction Company, Sedalia, Mo., has resigned to accept a position with the Trinidad Electric Transmission & Gas Company, Trinidad, Col.

Dr. Morton G. Lloyd, formerly technical editor of the *Electrical Review* and *Western Electrician*, has accepted a temporary appointment as associate engineer in the Bureau of Standards, Washington, D. C.

W. J. Kyle, who has had extensive experience in western electric and power properties, has been appointed general manager of the Bridgeton & Millville Traction Company, Bridgeton, N. J., succeeding B. F. Hires.

T. C. McReynolds, secretary, treasurer and general manager of the Indiana Railway & Light Company, Kokomo, Ind., has resigned on account of ill health which has made it necessary for him to reside in Phoenix, Ariz.

R. C. Green, heretofore master mechanic of the Easton (Pa.) Transit Company, has been appointed superintendent of equipment of the Lehigh Valley Transit Company, Allentown, Pa., succeeding Harry Branson, resigned.

Eugene McQuillin resigned on Feb. 21 as a member of the Public Service Commission of Missouri. His resignation was accepted to take effect at once. Mr. McQuillin will return to St. Louis and resume the practice of law.

W. A. Clow, formerly master mechanic of the Fox & Illinois Union Railway, at Yorkville, Ill., has resigned this position to become assistant master mechanic of the Joliet & Eastern Traction Company, at the shops, Frankfort, Ill.

J. E. Gallaher has been transferred by the Stone & Webster Management Association, Boston, from the Northern Texas Traction Company, Fort Worth, Tex., to the Houghton County Traction Company, and has taken the position of master mechanic.

M. P. Chapman, connected with the maintenance department of the Portland Railway, Light & Power Company in Oregon City, Ore., has resigned from that company to accept a foremanship with the Hawley Pulp & Paper Company of Oregon City.

Edward A. Maher, Jr., for over three years assistant general manager of the Third Avenue Railway, New York, has been appointed vice-president and general manager of the company, succeeding his father, Edward A. Maher, Sr., who was recently elected president.

G. L. Enfors is now superintendent of the repair shops and railroad and trolley divisions of the Porto Rico Railway, Light & Power Company, which has general offices at San Juan, P. R., and not at Ponce, as reported in the personal notes of the ELECTRIC RAILWAY JOURNAL of Feb. 3.

Benjamin F. Wood has resigned as vice-president and chief engineer of the United Gas & Electric Engineering Corporation, New York, and will devote his time in the future to B. F. Wood, Engineers, Inc., a new company of which Mr. Wood is president.

James E. Davidson, vice-president and general manager of the Pacific Power & Light Company, Astoria, Ore., will resign this position to take up work with the Electric Bond & Share Company, New York. His first work will be at Omaha, where he will be connected with the Omaha Electric Light & Power Company.

C. R. Collins has been appointed superintendent of the Grays Harbor Railway & Light Company, Grays Harbor, Wash. Mr. Collins has been connected with the Stone & Webster electric interests at Seattle, Wash. Previous to that he was with the Westinghouse interests in the East. He is a graduate of Purdue University.

George A. Hearn, who has served in various official capacities with the San Francisco, Napa & Calistoga Railway, Napa, Cal., including the positions of electrical engineer and later superintendent of power and equipment, has resigned from that company to accept a position with the Ogden, Logan & Idaho Railway, Ogden, Utah.

Otto Snyder, superintendent of the Electric Light Company, recently transferred to the Adirondack Power Company, Glens Falls, N. Y., has been temporarily re-installed by the Stone & Webster Management Association, Boston, at Houghton, as general superintendent of the lighting and traction companies, until the arrival of a successor to Gardner Rogers, transferred as noted elsewhere in this column.

Raymond H. Smith, vice-president and general manager of the Sheboygan (Wis.) Electric Company, has been elected vice-president of the Eastern Wisconsin Electric Company, which was incorporated on Feb. 21 in Wisconsin as a consolidation of the Eastern Wisconsin Railway & Light Company, Wisconsin Electric Railway, and the Sheboygan Electric Company.

Gardner Rogers, manager of the Houghton County Electric Light Company and Houghton County Traction Company, Houghton, Mich., has been transferred by the Stone & Webster Management Association, Boston, to the position of manager of the Woonsocket Division of the Blackstone Gas & Electric Company, with headquarters at Woonsocket, R. I.

B. F. Hires, who has been manager of the Bridgeton & Millville Traction Company and the Bridgeton Electric Company, Bridgeton, N. J., for the last seventeen years, and also in the same capacity for the Electric Company of New Jersey for the last year, has been appointed special agent of the American Railways, Philadelphia, which owns the property of the above-named companies.

Thomas Maclay has been elected president of the Petaluma & Santa Rosa Railway, Petaluma, Cal., succeeding Edward T. McMurray, attorney for the company, who has also held the office of president since the death of the late E. M. Van Frank, who for years was head of the company. Mr. Maclay has been one of the directors of the company and is president of the Petaluma Swiss-American Bank.

D. H. Braymer, who for the past two years has been engineering editor of the *Electrical World*, has resigned to assume the editorship of the *Electrical Record*. Mr. Braymer succeeds George A. Wardlaw, who will engage in free lance literary work. Prior to his connection with the *Electrical World*, Mr. Braymer was editor of *Electrical Engineering* of Atlanta, Ga., and of its predecessor, the *Southern Electrician*.

R. D. Jennison, vice-president of the West Virginia Traction & Electric Company, with office at Wheeling, W. Va., has left this position to become general manager of the Pennsylvania Utilities Company, Easton, Pa., succeeding W. D. Ray, whose resignation was announced in the ELECTRIC RAILWAY JOURNAL of Feb. 17. The Pennsylvania Utilities Company furnishes electricity, gas and electric railway service to Easton and neighboring towns.

J. A. Kunz has been appointed master mechanic of the Buffalo, Lockport & Rochester Railway, Rochester, N. Y.

Mr. Kunz has lately been foreman of one of the subway car shops of the Interborough Rapid Transit Company, New York, N. Y. Before that he was connected with the Brooklyn (N. Y.) Rapid Transit Company for twenty years, serving during the latter part of his term with the company as master mechanic of the elevated line shops.

J. A. Laing, for five years general attorney for the Pacific Power & Light Company, Astoria, Ore., and for the Portland Gas & Coke Company, will be elected vice-president of the former company. Previous to his railway work Mr. Laing practised law in New York. He is a graduate of Dartmouth, and has been a prominent member of the Progressive Business Men's Club in Portland. In addition to executive duties, he will continue in charge of the company's legal work.

Lewis A. McArthur, assistant general manager of the Pacific Power & Light Company, Astoria, Ore., since 1912, will succeed J. E. Davidson as general manager. Mr. McArthur is a native Oregonian. He graduated from the University of California in 1908, and for two years was employed by the Oregon Electric Railway, Portland, Ore. On the formation of the Pacific Power & Light Company, in 1910, he assumed the duties of chief clerk for Guy W. Talbot, president of the company.

Prof. R. C. Carpenter will sever his active connection with Cornell University at the end of the present college year, having reached the retiring age. He expects to maintain his activities in the fields of engineering and research, however, for several years to come. In resolutions recently passed the trustees referred to him as a pioneer in the field of experimental engineering, and said that as a teacher and investigator he is affectionately remembered by many generations of students, while his retirement from the faculty will be viewed with great regret by all his colleagues.

C. J. Munton, general manager of Fort Wayne & Northwestern Railway, Kendallville, Ind., and receiver of the Winona Interurban Railway, Warsaw, Ind., has been elected to Indiana State Senate. Before going to Kendallville in 1911 Mr. Munton was a division superintendent of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., having entered the employ of that company in 1896 as a motorman. He began his work in Kendallville as manager for the receiver of the old Toledo & Chicago Interurban Railway, organized in 1913 as the Fort Wayne & Northwestern Railway.

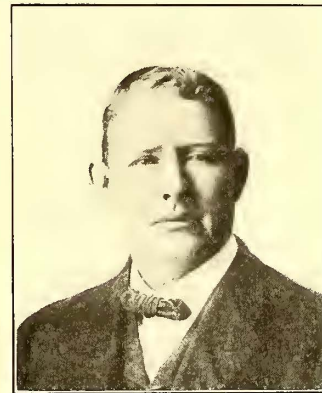
E. W. Moore, who has retired as president of the London (Ont.) Street Railway, will now be in a position to give his exclusive attention to the Lake Shore Electric Railway and the Cleveland, Painesville & Eastern Railway, of both of which he is president, and to the Detroit United Railway, of which he has been vice-president for the last twenty years. Both he and Henry A. Everett retain their interests in the London Street Railway. London is the old home of Charles Currie, who has succeeded Mr. Moore in that city, and having retired from the general managership of the Northern Ohio Traction & Light Company, Mr. Currie will have more time to devote to the company, although he will make his home at Akron, Ohio.

John B. Crawford, general superintendent of the Central Illinois Utilities Company, Paxton, Ill., has, in addition to this position, been elected vice-president of the company. From 1912 to the early part of 1916 Mr. Crawford was division superintendent of the Central Illinois Public Service Company, in charge of a large number of operating electric light and water properties. In the past Mr. Crawford has been connected with a number of railways, including the Lexington & Interurban Railways, Lexington, Ky.; Fort Wayne & Wabash Valley Traction Company, Fort Wayne, Ind.; Winona Interurban Railway, Warsaw, Ind.; Groton & Stonington Street Railway, New London, Conn., and Hartford (Conn.) Street Railway.

J. F. Strickland, president of the Texas Electric Railway, Dallas, Tex., a consolidation of the Texas Traction Company and the Southern Traction Company, is a native of Alabama. Mr. Strickland went to Texas in 1879, and has been associated with interurban and other utilities in that State since 1904, when he moved to Dallas. His first venture in electric interurban building was the promotion of

the Texas Traction Company. This company constructed the Dallas-Sherman line in 1906-08, and opened the road to traffic in July, 1908. More than \$2,000,000 was spent in building and equipping the line. Mr. Strickland, as president of the Texas Traction Company, was the moving force that put the line in the fore rank as an interurban property in Texas. Mr. Strickland's next venture was to promote the Southern Traction Company. This company built lines from Dallas to Corsicana, and from Dallas to Waco, a total of 156 miles. Mr. Strickland also organized the Texas Light & Power Company, which owns and operates electric light plants in various cities and towns, with its principal power plant on the line of the Texas Traction Company near McKinney. The Texas Light & Power Company has purchased the gas and electric lines in various cities, and is now supplying these cities with gas and electricity. Mr. Strickland is also president of the Dallas Securities Company, a company organized to handle the stock and bond issues of the various utility companies under his control. Mr. Strickland was the moving force in the consolidation of the Texas Traction Company and the Southern Traction Company, which was effected in January, 1917, and at the time of the consolidation was elected president of the Texas Electric Railway, the consolidated company. Mr. Strickland has also been interested in the reorganization of the Dallas street railway system, plans for which have been approved by the City Commission and an ordinance granting the traction and lighting franchises passed. These ordinances, on the motion of Mayor Lindsley of Dallas, have been submitted to a referendum election to be approved by the majority of the voters of Dallas before becoming effective.

Burr Martin, vice-president and general manager of the Texas Electric Railway, Dallas, Tex., became associated with electric railway properties in Texas early in 1907, at



BURR MARTIN

the time J. F. Strickland began the financing and construction of the interurban line from Dallas to Sherman, under the name of the Texas Traction Company. Mr. Martin was appointed purchasing agent for that company, and served in the capacity mentioned during the construction of the line. At the time the Dallas-Sherman interurban line was put in operation in July, 1908, Mr. Martin was appointed claim agent for the Texas Traction Company. When the Southern Traction Company was organized in 1911

for the purpose of building interurban lines from Dallas to Waco and from Dallas to Corsicana, a total distance of 156 miles, Mr. Martin was appointed assistant to J. F. Strickland, the president, and in 1912 was elected president of the Southern Engineering & Construction Company, which built the lines of the Southern Traction Company. In this capacity he had charge of the construction and equipping of the entire mileage of the lines from Dallas to Waco, and from Dallas to Corsicana. In 1915 Mr. Martin was appointed general manager of the Texas Traction Company and the Southern Traction Company, the so-called Strickland Lines. He held that position until the two companies were consolidated in January, 1917. At the time the two lines were consolidated as the Texas Electric Railway, owning and operating 251 miles of line, extending from Denison to Dallas, there branching into two lines, one to Waco and the other to Corsicana, Mr. Martin was elected vice-president and general manager of the Texas Electric Railway.

Obituary

R. E. Griffith, claim agent for the Beaumont (Tex.) Traction Company since last June and prior to that an employee of the Northern Texas Traction Company at Fort Worth, Tex., died in Beaumont on Feb. 17.

Legal Notes

CHARTERS, ORDINANCES, FRANCHISES

NEW YORK.—*Power of City to Require Relocation of Tracks.*

Since the implied power of a municipal corporation must be essential to the exercise of an express power and not merely convenient thereto, the power of a city to compel a street railway to move its track from the side to the center of a street cannot be implied from the power granted in the city charter to discontinue, lay out, widen, open, alter, change the grade or otherwise improve roads, avenues or streets. (People ex rel. City of Olean v. Western New York & Pennsylvania Traction Co., 108 Northeastern Rep., 847.)

NORTH CAROLINA.—*Operation of Freight Cars by Street Railway Not Enjoined.*

In the absence of an allegation of irreparable damage or serious injury by the operation of freight cars over a street railway, the courts will not enjoin the operation which is in the nature of a public enterprise and improvement and for the welfare of the community. (Turner et ux. v. North Carolina Public Service Co. et al., 86 S. E. Rep., 1033.)

NORTH CAROLINA.—*Interurban Road May Be Classed as Steam Road as Regards Abutting Property Owners.*

An interurban railroad, though operated by electric power, which ran freight trains through the streets and interchanged cars with ordinary steam railroads, must be classed as a steam railway, and an abutting owner, injured by the noise and dirt from the trains which passed in the street in front of his house, could recover damages. (Kirkpatrick et al. v. Piedmont Traction Co., 87 Southeastern Rep., 232.)

NEW YORK.—*Deductions from Franchise Tax.*

Under the State franchise tax law, a company may deduct from its State tax any sums paid to the municipality for its franchise. (New York Railways v. City of New York, 113 Northeastern Rep., 501.)

LIABILITY FOR NEGLIGENCE

ILLINOIS.—*Injury to Motorman in Failing to Turn off Controller Before Backing Car.*

A motorman directed to take a trolley car from the barn and injured by the backing of it when he put the trolley on was guilty of contributory negligence in not first seeing whether the controller was turned on, which he could have done had he looked, though under the rule of the company and the custom of the men, the one who last had the car should have removed the controller and the reverse lever and turned the power off, so that the putting on of the trolley would not have started the car. (Lossechewich v. Chicago City Railway, 113 Northeastern Rep., 896.)

MASSACHUSETTS.—*Infant Injured Through Negligence of 12-Year-Old Custodian.*

Where the twelve-year-old brother of an irresponsible infant went upon the street car tracks with him, without looking, in front of an approaching car, in plain sight, only a short distance away, and the infant was killed by the car, there can be no recovery. (Garabedian v. Worcester Consol. St. Ry., 113 Northeastern Rep., 780.)

MONTANA.—*Injuries from Broken Register Strap—Sufficiency of Inspection.*

Where straps in a street car used for registering fares were inspected by looking at them but were not tested by ringing fares, the company was liable where a strap broke, causing the conductor to fall upon the plaintiff. (Batch v. Helena Light & Ry. Co., 159 Pacific Rep., 411.)

NEW YORK.—*Assault by Conductor Where Passenger Was Aggressor.*

That a passenger on a street car was the aggressor in an altercation over his right to a transfer does not justify the conductor in assaulting him, and, where the conductor so assaulted him, substantial damages should be imposed. (Schwartz v. New York Rys., 160 New York Supp. 1081.)

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

Eastern Wisconsin Electric Company, Grand Rapids, Mich.—This company filed articles of incorporation with the secretary of state of Madison, Wis., on Feb. 21. It will be the successor company by consolidation of the Eastern Wisconsin Railway & Light Company, the Wisconsin Electric Railway and the Sheboygan Electric Company. Officers: Joseph H. Brewer, Grand Rapids, president; Raymond H. Smith, Sheboygan, vice-president; Willis J. Ripley, Grand Rapids, treasurer, and Blaine Gavett, Grand Rapids, secretary.

***United National Utilities Company, Philadelphia, Pa.**—This company has filed a charter at the State Department in Dover, Del. Capital stock, \$20,000,000. Incorporators: F. R. Hansell, Joseph F. Cotter, Philadelphia, and S. C. Seymour, Camden, N. J.

FRANCHISES

Los Angeles, Cal.—The Pacific Electric Railway has received a franchise from the City Council for a right-of-way on Eighth Street between Los Angeles Street and Maple Avenue.

Boston, Mass.—The Public Service Commission of Massachusetts has granted a one-year's extension of time to the Boston Elevated Railway for the completion of the Mystic River railway bridge and viaduct which is to carry the elevated system into Everett.

Buffalo, N. Y.—The International Railway has asked the Public Service Commission for the Second District of New York for its approval of the construction of extensions of the company's tracks in Elmwood Avenue from Hertel Avenue to the north city line and in Franklin Street from Chippewa Street to Allen Street.

Philadelphia, Pa.—The city of Philadelphia has asked the Public Service Commission of the Commonwealth of Pennsylvania for a certificate of public convenience, approving the plans and authorizing the construction of an elevated railway beginning at or near Thirtieth and Market Streets with a connection to the present Market Street elevated line, thence southwardly over Thirtieth Street to a point south of Walnut Street, thence over private right-of-way along the route of the Pennsylvania Railroad, thence over Gray's Ferry Avenue to Forty-ninth Street, thence over Woodland Avenue to the city limits, about 4.5 miles.

Olympia, Wash.—The Tacoma Railway & Power Company has applied to the County Commissioners of Thurston County for a franchise to erect, maintain and operate electric transmission lines from the Tacoma city limits to the Brown Ranch near Nisqually. The proposed improvement is the initial step toward the extension of light and power service through this section of Thurston County, and it is believed is the forerunner of interurban connections between Tacoma and Olympia.

TRACK AND ROADWAY

Municipal Railways of San Francisco, San Francisco, Cal.—A contract has been let by the Board of Works to the Telephone Equipment Company, San Francisco, to supply 34,500 lb. of electric trolley wire to the Municipal Railways for \$13,702. The wire will be used on the Twin Peaks tunnel extension and on that part of the upper Market Street line between Van Ness Avenue and Church Street.

Washington, D. C.—As a result of a recent meeting held at Westminster, a committee will be appointed by William Mather, Jr., who presided, to secure rights-of-way for the proposed electric railway from Washington, D. C., to Gettysburg, Pa., via Westminster, 75 miles. The Southern

Finance & Construction Company, Nashville, Tenn., of which John K. Parsons, Wilmington, Del., is president, and R. B. Herzer, Nashville, is secretary, was previously reported interested in such a line. [Jan. 27, '17.]

Public Service Corporation of New Jersey, Newark, N. J.—Thomas N. McCarter, president of the Public Service Corporation of New Jersey, on Feb. 19 informed Mayor Thomas L. Raymond of Newark that plans which have been under discussion for the last year between his company and the Pennsylvania Railroad have been completed and agreed upon for the linking of the high speed lines of the Pennsylvania Railroad which enter Newark at the Park Place Terminal of the Hudson & Manhattan Railroad, and the Public Service trolley system, which also has a terminal in Park Place, Newark. As noted in the *ELECTRIC RAILWAY JOURNAL* for Feb. 24, page 361, the work proposed will cost between \$800,000 and \$1,000,000.

Brooklyn, N. Y.—As the first step toward carrying out the new transit plans for the relief of central Brooklyn, the Public Service Commission for the First District of New York has adopted the general route to provide for a connection between the Fulton Street elevated line and the Fourth Avenue subway at Ashland Place. The consent of the Board of Estimate and of the Mayor will be asked to this new route and if these are obtained the commission will make an effort to obtain the consents of the abutting property owners. The route in question extends along Fulton Street between Vanderbilt Avenue on the east and Rockwell Place on the west with a spur for one track through Lafayette Avenue and abutting private property for a short distance. The two tracks provided for in this route will begin to depress near Vanderbilt Avenue and will go underneath the surface of Fulton Street just west of Carlton Avenue.

Brooklyn (N. Y.) Rapid Transit Company.—Work will soon be begun by the Brooklyn Rapid Transit Company on the elevated structure to be erected along the Long Island Railroad cut, between Wyckoff and Irving Avenue. That section of the improvement will connect the elevated lines extending from the Ridgewood section to the Williamsburg and Manhattan bridges and the lines now being completed by the Brooklyn Rapid Transit Company in the fourth ward and will also give express service from the south side of the borough and the Ridgewood section to the southerly business sections of Manhattan and will make it possible to reach Manhattan in about fifteen minutes from the Ridgewood section and thirty minutes from the Jamaica zone.

Panama Traction Company, Jamestown, N. Y.—A contract has been awarded to Herbert Norton, Jamestown, for the construction of a bridge over the Stillwater Creek at Busti Corners in connection with this company's proposed line from Youngsville, Pa., to Jamestown, N. Y. D. L. Davis, Jamestown, general manager. [Feb. 10, '17.]

Toronto (Ont.) Civic Railway.—The cost of a single-track extension of the Bloor Street car line on Bloor Street from Quebec Avenue has been estimated by R. C. Harris, commissioner of works, at \$30,000.

Southern Pacific Company, Portland, Ore.—An elevated viaduct and grade crossing over Second Street, La Grande, will be constructed by the Southern Pacific Company. The proposed structure will be of steel construction and will cost about \$330,000.

West Penn Traction Company, Pittsburgh, Pa.—The construction of an extension to West Newton and other Youghiogheny River towns, connecting with its present lines at Hunker or at Greensburg, is being considered by the West Penn Traction Company.

Houston, Richmond & Western Traction Company, Houston, Tex.—At a recent meeting of the officers and directors of the Houston, Richmond & Western Traction Company the name of the company was changed to the Houston, Gonzales & San Antonio Traction Company. The capital stock of the company was increased from \$50,000 to \$250,000. Ed Kennedy, the original promoter of the line, retired, and Frank Helbig and W. A. Reinhart were appointed to take active charge of the affairs of the company at Houston. Steve Holmes, president. [Dec. 30, '16.]

San Antonio (Tex.) Traction Company.—It is reported that the San Antonio Traction Company proposes to construct an extension several miles long.

Ashland Light, Power & Street Railway, Ashland, Wis.—An extension from Hurley to Montreal will be built by the Ashland Light, Power & Street Railway immediately. The construction of a line between Washburn and Ashland is also being contemplated.

SHOPS AND BUILDINGS

Chicago & Joliet Electric Railway, Joliet, Ill.—This company will construct a new office building at Joliet, estimated to cost \$35,000.

Detroit (Mich.) United Railway.—This company is making plans for a new storage yard for track materials to occupy a 21-acre tract of land on the Rouge River and West Fort Street. The present 9-acre yard at Harper and Mount Elliott Avenues will be turned over to the transportation department for use as an operating station for the new Grand Belt line, which at present has no car station nearer than 2 miles from the line, resulting in a large dead mileage. The plans for buildings and equipment in the new storage yard have not been completed, but these will include the erection of an office building for the track department, clerical force and superintendent, a car repair shop, machine shop, foundry, carpenter shop and stock room, sand drier, a stone crusher with 1600 tons a day capacity and other equipment. It is estimated that it will require more than \$400,000 to carry the plans to completion.

Interborough Rapid Transit Company, New York, N. Y.—The Public Service Commission for the First District of New York has directed a public hearing on the form of contract for the furnishing of structural steel for inspection sheds at the 180th Street and 239th Street car storage yards on the White Plains Road line. The two yards will provide sufficient capacity for the storage of several hundred subway cars and in addition the Interborough Rapid Transit Company will construct the yard at 239th Street for the storage and inspection of elevated railroad cars.

POWER HOUSES AND SUBSTATIONS

United Railways & Electric Company, Baltimore, Md.—Carrying out plans for the betterment of traffic conditions, this company will soon begin the construction and equipment of a new substation in the eastern section. The company has only recently completed and is now equipping another such station on Belvedere Avenue in the northwestern suburbs, and the cost of these two important accessories of the system will exceed \$330,000. The latest station will be on the Sparrow's Point Line and will handle the current used on all the lines that traverse the county to the east of the city limits. The Sparrow's Point station will bring the number of the company's stations of this character to seven, and will very nearly approximate in general style and equipment the Belvedere station. The building housing this equipment is of reinforced concrete of attractive design, the floor plan being 51 ft. by 74 ft.

Kansas City (Mo.) Railways.—Recommendations have been made to this company for changes in its power facilities which will involve a total expenditure of \$370,000, including \$100,000 for the power plant proper, \$161,000 for the substations and \$30,000 for the switch-house. These improvements are referred to more in detail on page 404 of this issue.

Northern Ohio Traction & Light Company, Akron, Ohio.—Contracts have been let by the Northern Ohio Traction & Light Company for six 1000-kw. rotary converters and four boilers to be installed in its Gorge power house.

Cleveland (Ohio) Railway.—A contract has been awarded by the Cleveland Railway to W. I. Thompson & Son Company, Cleveland, for the construction of a substation at 2162 Ashland Road, to cost about \$60,000.

Ashland Light, Power & Street Railway, Ashland, Wis.—The capacity of the power plant of the Ashland Light, Power & Street Railway at Ashland will be increased from 3000 to 12,000 hp.

Manufactures and Markets

Discussions of Industrial Conditions

A Department for the Manufacturer, Salesman and Purchasing Agent

Rolling Stock Purchases

Business Announcements

Trade Literature

First Year's Sales of Davis Wheels

Introduced to Electric Railways a Year Ago, Now
Used by a Number of Large Roads—One-Wear
Idea Has Met with Favor

The total sales of Davis steel wheels for 1916 showed an increase of 388 per cent over the sales for 1915. Not a large proportion of these sales, however, were in the electric railway field, because this one-wear steel wheel with its manganese tread was offered only for general sale to the electric railways with the beginning of 1915, although it served in steam railroad service about eight years, under both freight and passenger cars. According to Owen W. Middleton, of the American Steel Foundries, Chicago, Ill., in earlier years there were uncertainties in the manufacture of steel castings, which hindered the profitable manufacture of cast-steel wheels. However, improvements in foundry processes and refinement of metals, together with the use of the manganese mixture for the wearing parts of the tread and flange resulted about eight years ago in the manufacture of this wheel.

Although the American Steel Foundries have nine plants, eight of which are steel foundries and the other an assembling plant, the manufacturing of wheels is done in only one plant, that being in Granite City, Ill., a suburb of St. Louis. The other plants manufacture steam railway and similar specialties, such as truck frames, bolsters, journal boxes and springs, as well as heavy castings for industrial use.

ONE-WEAR WHEEL INTRODUCED IN 1911

The Davis steel wheel was introduced to the electric railway field for general sale only after it had shown itself to be fitted for severe conditions. The first Davis wheels to be used by an electric road were installed in 1911 by the Detroit United Railway. That company first purchased sixteen wheels, later twenty-four more, and since has ordered several hundred. The San Francisco & Oakland Terminal Railways installed a few Davis wheels in 1912. Subsequent orders specified 33-in. wheels under its city cars and 36-in. M.C.B.-tread wheels under its large Key Route cars. The Illinois Traction now has 1666 Davis wheels in service under various classes of equipment. Other properties which have purchased this type of wheel for city or interurban service include the Pacific Electric Railway, Chicago Surface Lines, Cincinnati Traction Company, American Railways, Kansas City Railways, Terre Haute, Indianapolis & Eastern, Union Traction of Indiana, Indianapolis & Cincinnati Traction Company, the Boston Elevated and the Long Island Railroad.

The manufacturers point out that the Davis wheel is an example of the product of highly perfected wheel foundry practice. The tread of the wheel is cast of manganese steel. It has a hardness midway between that of a chilled cast-iron wheel and that of a rolled wheel. The manganese steel gives to the tread and flange qualities of ductility and toughness combined with high tensile strength. The hub and plate are soft steel. The chief claim for this type of wheel is its large mileage on one wear, without turning, grinding or other maintenance expense. These wheels are said also to be about 20 per cent lighter than other wheels designed for the same service.

The principle of a one-wear wheel is reported by Mr. Middleton to have met with especial favor by electric railways. The uniform diameter assures that couplers, platform and step height can be maintained practically constant; that motor and gear case clearances remain uniform and the motor load and speed characteristics remain the same throughout the life of the wheel. This is particularly im-

portant in alternating-current service. Elimination of wheel turning reduces the number of changes and results in a reduction of motor and journal bearing expense as well as gear and pinion expense.

The special tough ductile material in the tread of the wheel and the fact that the wheels are ground round before shipment give this type of wheel, according to its manufacturer, less tendency for slid-flat wheels. Also, if one occurs, the flat spot will roll itself out as in wrought steel wheels. The price of the Davis one-wear manganese steel wheel is about the same as that of the wrought steel wheel. The delivery situation is not so good now as it was before the steam roads placed their large freight car orders in the fall. However, shipments of quantities for electric railway use can be made in from four to five months.

Anti-Friction Center and Side Bearing Business Growing

Many Tests and Studies Being Made—Special Type
of Side Bearing Now Available for Maximum
Traction Trucks

The present widespread interest in side and center bearings for electric railway car trucks is no doubt due to the prevailing high prices of wheels and of labor for making wheel changes. Any device now merits attention that will decrease rail and wheel wear, and lessen the number of pull-ins for wheel renewals.

According to W. McK. White, of Holden & White, Chicago, general sales agents for Hartman center bearings and Perry side bearings, "the merits of anti-friction bearings have been recognized in the past by mechanical engineers, but the actual interest in buying is now greater than ever before in the electric railway industry. Many roads have carried on studies to determine the reduction in wheel wear due to the use of self-aligning truck bearings. One of the most notable of these tests was made by a steam road. It was found that a certain class of engines could pull sufficient additional tonnage on a train equipped with anti-friction bearings to pay for the entire truck-bearing equipment out of the savings in one run of 1000 miles. As a result of this test the Pittsburgh & Lake Erie in December placed an order for 2000 car equipments of Hartman center bearings. The self-centering action of this center bearing offers resistance to truck turning, but that resistance does not equal the resistance of a friction plate. At the same time the nature of the action does prevent the truck from flapping from rail to rail at high speed."

Mr. White states that while a great many center bearings in the past have been installed under electric railway cars, the Hartman bearing is the first with balls larger than 2 in. in diameter to be offered to the electric railways. The large-size ball permits a raceway that carries the load over two-thirds of the circumference of the ball. This design is said to eliminate pitting in the raceways.

Holden & White have made sales of anti-friction center or side bearings to about thirty-five electric railways for initial installations to determine service results and also have sold such bearings in larger quantities to thirty other electric roads. The Chicago Elevated Railways have 500 sets of side bearings installed. Another large user is the Des Moines City Railway. These center and side bearings in their present form were first offered to the electric railways in February, 1916.

Inquiries and prospects according to Mr. White indicate that the sales for 1917 will show a large increase. The manufacturers have been fortunate in being able to make

prompt deliveries throughout the past year. Manufacturing costs have forced an increase of about 20 per cent in the selling price. The cost of the steel balls alone has increased 112 per cent. A large part of the sales of these center and side bearings has been for equipping new cars. Mr. White said, "There does not seem to have been a widespread desire on the part of the electric railway managements to install anti-friction bearings on old trucks, even though special bearings have been designed for some types, such as the maximum traction truck. This side bearing for the maximum traction truck is anti-friction both as to load and torque. A number of roads, very recently, have shown special interest in this bearing. It is recognized that there is more friction loss in turning a maximum traction than any other type of truck. This is particularly true on the older maximum traction trucks where no center bearings were used and where the weight and turning efforts had to be carried on bronze shoes in channel-section raceways. The special traction, anti-friction side bearings will greatly decrease the liability for derailment as well as reduce flange wear, and in turn reduce the power required for driving the car. These facts, we believe, will bring about the introduction of anti-friction truck bearings on old as well as new cars. The investment immediately produces economies in operating costs."

CURRENT PRICES FOR MATERIALS

Quoted Wednesday, Feb. 21

Copper (electrolytic).....	New York, 36½ cents per pound
Rubber-covered wire (base).....	New York, 40 cents per pound
No. 0000 feeder cable (bare).....	New York, 37½ cents per pound
No. 0000 feeder cable (stranded).....	New York, 35 cents per pound
No. 6 copper wire (insulated).....	New York, 37½ cents per pound
No. 6 copper wire (bare).....	New York, 37 cents per pound
Tin (straits).....	New York, 50½ cents per pound
Lead.....	New York, 9¾ cents per pound
Spelter.....	New York, 10¾ cents per pound
Rails, A. S. C. E., O. H.....	Mill, \$40 per gross ton
Rails, A. S. C. E., Bess.....	Mill, \$38 per gross ton
Wire nails.....	Pittsburgh, \$3 per 100 pounds
Steel (bars).....	Pittsburgh, 3¼ cents per pound
Sheet iron (black, 24 gage).....	Pittsburgh, 4.65 cents per pound
Sheet iron (galv., 24 gage).....	Pittsburgh, 6.30 cents per pound
I-beams over -15 in.....	Pittsburgh, 10 cents per pound
½-in. galv. extra high strength steel wire.....	New York, \$6.82 per 100 ft.
¾-in. galv. high strength steel wire.....	New York, \$3.41 per 100 ft.
¾-in. galv. Siemens-Martin wire.....	New York, \$2.52 per 100 ft.
5/16-in. galv. Siemens-Martin wire.....	New York, \$1.94 per 100 ft.
Galvanized barb wire and staples.....	Pittsburgh, 3.85 cents per pound
Galvanized wire (ordinary).....	Pittsburgh, 3.65 cents per pound
Cement (carload lots) with rebate for sacks.....	New York, \$2.02 per barrel
Cement (carload lots).....	Chicago, \$2.06 per barrel
Cement (carload lots).....	Seattle, \$2.60 per barrel
Sand in large lots.....	New York, 50 cents per ton
Linseed oil (raw, 5-bbl. lots).....	New York, 94 cents per gallon
Linseed oil (boiled, 5-bbl. lots).....	New York, 95 cents per gallon
White lead (100-lb. keg).....	New York, 9¾ cents per pound
Turpentine (bbl. lots).....	New York, 51½ cents per gallon

OLD METAL PRICES

Copper (heavy).....	New York, 29 cents per pound
Copper (light).....	New York, 24 cents per pound
Red brass.....	New York, 19½ cents per pound
Yellow brass.....	New York, 18 cents per pound
Lead.....	New York, 7½ cents per pound
Zinc.....	8 cents per pound
Steel car axles.....	Chicago, \$34 per net ton
Iron car wheels.....	Chicago, \$18 per gross ton
Steel rail (scrap).....	Chicago, \$24.50 per gross ton
Steel rail (relaying).....	Chicago, \$34 per gross ton
Machine shop turnings.....	Chicago, \$9.25 per net ton

Car Orders Largest Since 1906

Annual Report of Pressed Steel Car Company Shows Marked Advances for Year 1916

The gross sales of the Pressed Steel Car Company, New York, N. Y., for 1916 amounted to \$31,202,646 as compared to \$17,492,620 in 1915. The highest preceding totals were \$27,975,978 in 1910 and \$30,967,359 in 1913. In the last year the net profits derived from operations, interest, dividends and all other sources, after deducting \$425,678 for repairs and renewals to buildings and machinery, were \$3,051,152, as compared to \$1,517,457 for the previous year. After deducting \$1,406,250 for preferred and common dividends at 7 per cent and 4¼ per cent respectively and \$300,000 for depreciation out of the 1916 earnings, \$1,344,902 was added to working capital, including surplus and undivided profits.

According to the annual report of the company, the buy-

ing movement for domestic cars dropped off early in 1916 and was not resumed until the latter part of September. The orders placed for the entire year, however, were larger than those placed in any year since 1906. The failure of the railroads to purchase more cars may be accounted for in part by the agitation of their employees for increased wages and in part by the increased costs of everything in use. It is believed, however, that if an account could be kept of the business losses caused by failure to receive materials on time and the losses caused by congested terminals and embargoes, the sum of these would greatly exceed the amount required by the railroads to provide and maintain ample equipment and adequate terminal facilities.

The company, it is said, enters 1917 with a comfortable order book, mostly domestic, but the financial results for the year will largely depend upon its ability to secure a regular supply of raw materials and labor. It is felt that domestic business has gained such an impetus that there will be an increased demand for equipment, both at home and abroad, regardless of an immediate or delayed peace in Europe.

B. F. Wood, Engineers, Incorporated

B. F. Wood, Engineers, Inc., has been organized with headquarters in the Woolworth Building, New York, to investigate, design and construct engineering works in power development, transmission, railroad electrification, electric railways and lighting system and industrial plants. Benjamin F. Wood, president of the company, was born Feb. 29, 1872, in Fayetteville, Ark., and in 1893 graduated in the course of electrical engineering from the University of Arkansas. The next five years were spent in practical work with various companies. On Jan. 1, 1898, he entered the service of the Pennsylvania Railroad at Altoona, Pa., soon afterward being given the title of assistant engineer. In that capacity he had charge of the electrical work east of Pittsburgh, Pa., including the design and construction of power houses and of principal terminals, among which were the Pittsburgh Station and the Union Station in Washington, D. C. He was a member of the electrical and mechanical advisory committee for the railroads of the New York extension. This committee had general supervision of the mechanical features of the tunnels, the new Pennsylvania Station in New York City and the Long Island City Power Station and the motive-power facilities of Sunnyside yards. While with the Pennsylvania Mr. Wood made reports on the electrification of a low-grade freight line and two main line divisions over the Allegheny mountains at Altoona. In 1913 he became associated with the United Gas & Electric Engineering Corporation as vice-president and chief engineer, and had general supervision of the engineering work on the various subsidiary properties of this corporation. Mr. Wood is president of the United States Reduction Company and a director in the Texas Iron & Steel Company. He is a member of the A. I. E. E. and of the A. S. M. E. and also a member of the electricification committee of the N. E. L. A. and of the power station committee of the A. I. E. E.

Walter E. F. Bradley, vice-president of the company, was born in New York City, Feb. 26, 1883. He attended Columbia University and graduated in electrical engineering in 1905. He first took up experimental work and later was connected with Peter Cooper Hewitt. In 1907 he became a member of Charles S. Bradley & Sons, and in 1913 again returned to Peter Cooper Hewitt as engineer.

Alonzo B. Bradley, secretary and treasurer, was born in Avon, N. Y., Jan. 21, 1880. He graduated from Columbia University in electrical engineering in 1903 and entered the employ of the General Electric Company. He next was employed by American Telephone & Telegraph Company and left this company to become a member of Charles F. Bradley & Sons. For the last four years he has been connected with the C. N. Hunt Company.

ROLLING STOCK

Trenton & Mercer County Traction Corporation, Trenton, N. J., is in the market for ten double-truck city cars.

New York State Railways, Rochester Lines, Rochester, N. Y., is reported to be in the market for twenty-five city cars.

International Railway, Buffalo, N. Y., has purchased from the G. C. Kuhlman Car Company fifty single-end double-truck cars for city service.

Fonda, Johnstown & Gloversville Railroad, Gloversville, N. Y., noted in last week's issue as being in the market for four cars, has placed the order with the Wason Car Company.

Austin (Tex.) Street Railway, noted in the ELECTRIC RAILWAY JOURNAL of Feb. 3 as purchasing four one-man pay-as-you-enter cars from the American Car Company, has specified the following details for this equipment:

Builder of car body.	Fare boxes	Johnson
American Car Company	Fenders or wheelguards . . .	H. B.
Type of car—Single-truck, one-	Gears and pinions,	
man, pay-as-you-enter	General Electric	
Seating capacity	Hand brakes	American Car
Weight (total)	Headlights	Golden Glow
Length over bumpers	Motors, type and number,	
Length over vestibule	2 G. E.—258A	
Width over all	Motors, outside or inside	
Height, rail to trolley base,	hung	Inside
10 ft. 1 in.	Paint, varnish or enamel,	
Body, wood, semi-steel or	Paint and varnish	
all steel	Registers	International
Interior trim	Sash fixtures	Brill renitent
Headlining	Seats, style	Brill reversible
Roof, arch or monitor	Seating material	Cherry wood
Air brakes	Step treads	Feralun
General Electric	Trolley catchers	Keystone
Axles	Trolley base	G. E. ball bearing
Curtain fixtures	Trucks, type 21 E, American Car	
Curtain Supply	Ventilators	American Car
Curtain material	Wheels (type and size),	
Door operating mechanism,	24 in. cast iron	
Safety Car Devices		

TRADE NOTES

Precision Instrument Company, Detroit, Mich., announces that the Vincent & Gilson Engineering Company, 30 Church Street, is representing them in New York City.

Titanium Alloy Manufacturing Company, Niagara Falls, N. Y., announces that its New York office has been moved from 15 Wall Street to the City Investing Building, 165 Broadway.

S. A. Megeath has resigned as president and general manager of the Galena Signal Oil Company in order to devote his attention exclusively to the refining and foreign branches of the business. He has been succeeded as president by his father-in-law, General Charles Miller.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., announces that it has combined offices with the Westinghouse Lamp Company in San Francisco. The new offices, which are located in the First National Bank Building, will be in charge of C. E. Heise, district manager.

Stroh Steel-Hardening Process Company, Pittsburgh, Pa., announces that it has opened offices at 728 Monadnock Building, Chicago, Ill., in charge of F. Floyd Mark, Western sales manager. This company's steel castings, which are made by a special process, are in general use in the steel, cement and mining industries.

Bonham Recorder Company, Hamilton, Ohio, announces the completion of its organization with the election of the following officers: president, E. E. Dwight, president Tool Steel Gear & Pinion Company; vice-president and general manager, G. Y. Bast; secretary and treasurer, C. S. Wilson; mechanical engineer, L. Bonham. The first three named and J. E. Stacey and C. A. Wilson form the board of directors of the company.

W. S. Barstow Management Association, New York, N. Y., has been incorporated and will supervise the management of all public utilities properties controlled by the General Gas & Electric Company, the Eastern Power & Light Corporation and W. S. Barstow & Company, Inc. E. L. West has been elected president of the new corporation, the offices of which are at 50 Pine Street, New York City.

Frank M. Erb, formerly superintendent of production, R. D. Nuttall Company, has severed his connection with that company. He will open an office in the Second National Bank Building, Pittsburgh, Pa., on or about March 5, as a manufacturers' district representative and will handle castings and forgings. Among the companies he will represent are the National Forge & Tool Company, Erie, Pa., the Silver Manufacturing Company, Salem, Ohio, and the Standard Steel Casting Company, Cleveland, Ohio.

Standard Underground Cable Company, Pittsburgh, Pa., announces that at the January meeting of the board of directors Charles J. Marsh was elected a vice-president of the company. Mr. Marsh is a brother of Joseph W. Marsh, president of the company, and has for many years been manager of the eastern and northeastern sales departments and also principal metal buyer of the company, with headquarters in New York City.

Canadian Westinghouse Company, Ltd., Hamilton, Ont., Canada, at the recent annual meeting of the board of directors elected Paul Judson Myler president. H. H. Westinghouse, retiring president, was elected chairman of the board. Mr. Myler was born in Pittsburgh, April 24, 1869. He was educated in the public schools of Pittsburgh, graduating from the Pittsburgh Central High School. In 1886 he entered the employ of the Westinghouse Air Brake Company as bill clerk in their Allegheny shops, and in 1896 he was appointed secretary of the Westinghouse Manufacturing Company at Hamilton, Ont., Canada. The following year he was made secretary-treasurer. In 1903 the company was reorganized as the Canadian Westinghouse Company and Mr. Myler was made vice-president and general manager.

ADVERTISING LITERATURE

Beaudry & Company, Inc., Boston, Mass., has just issued a twenty-page booklet on their belt and motor-driven power hammers.

Central Electric Company, Chicago, Ill., has issued bulletin No. 60 on its Max-o-lite fittings for shops, freight sheds, warehouses, terminals, factories, round houses, docks and yards.

Precision Instrument Company, Detroit, Mich., has issued a loose-leaf catalog entitled "Precision." This catalog contains bulletins on CO₂ Combustion Recorders, "Pico" Gages, Indicating and Recording Precision Gages, Precision Micrometer Gages, U Type Gages, Precision Efficiency Kit, Gas Collectors, and Water Meters.

Youngstown Sheet & Tube Company, Youngstown, Ohio, manufacturer of iron, steel and other products, has issued an attractive calendar for 1917. This calendar contains twelve large two-color photographic views showing the processes used in the manufacture of pipe and other products.

National Tube Company, Pittsburgh, Pa., is distributing a 200-page appendix to its book of standards which was distributed in 1913. This publication has a widely acknowledged value, as evidenced by the constantly increasing requests for copies from technical and practical engineers, mechanical men, manufacturers, students and others interested in pipe and allied products.

NEW PUBLICATION

Investigation of Cartridge Enclosed Fuses. Bureau of Standards Technologic Paper No. 74. Government Printing Office, Washington, D. C. 224 pages.

The Department of Commerce has issued this report on the "Economy" refillable fuses based on elaborate investigations. The bureau's investigation showed that this type of fuse when new and properly filled or refilled operates satisfactorily under the most common working conditions of overload and moderate short circuits when in circuits with low inductance, and possesses some marked advantages over the approved fuses with which it has been compared. The bureau recommends, however, that these fuses be not approved at present for general use on the same basis as fuses at present listed as standard by Underwriters' Laboratories (Inc.), but that their use be permitted by municipal and underwriters' inspection departments under conditions where the performances can be observed by each inspection department until sufficient experience regarding their performance under service conditions can be obtained to justify an unqualified approval or refusal to approve.

Copies of the paper may be obtained by addressing requests to the Bureau of Standards. Additional copies can be secured at fifty-five cents each from the Superintendent of Documents, Government Printing Office.